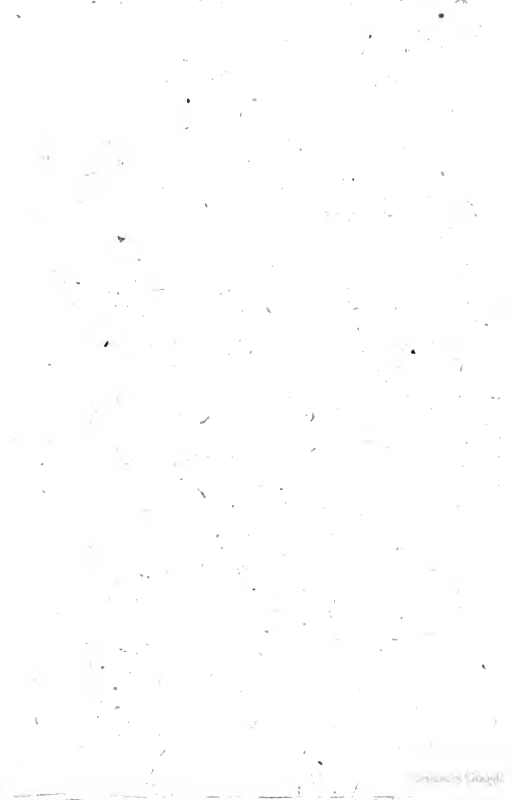
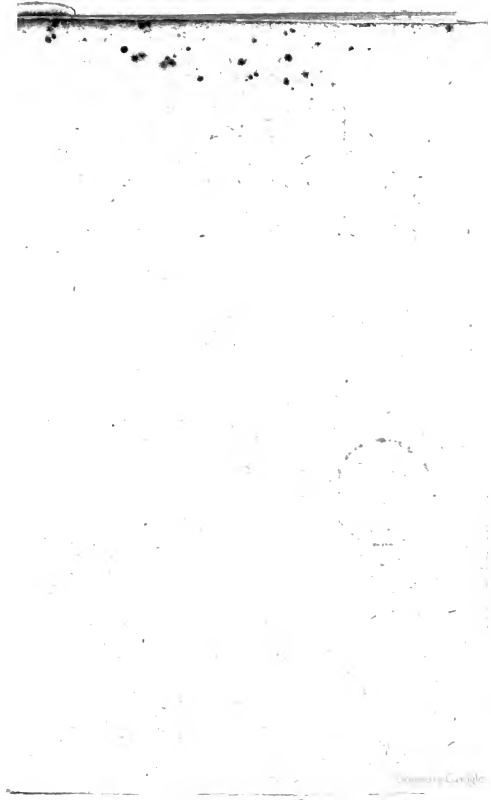




5.6.224









TRIGONOMETRIÆ

PLANÆ, ET SPHÆRICÆ

SYNOPSIS

AD CAPTUM TYRONUM PRÆCIPUE *ἀναφορῶν*

ACCOMMODATA,

Cum Tabulis Logarithmicis Sinuum, &
Tangentium ad Radium 10.0000000,

NEC NON

Logarithmorum Numerorum Naturalium
ab 1 ad 10000,

*Quibus summâ facilitate generali Ne-
pert Regulâ Triangulorum omnium
absolvitur Resolutio.*

Qui neque sic capiunt, non sibi dicta putent.



*Cuncta Trigonus habet, satagit que doctus Mathesis,
Ille aperis clausum quid quid Olympus habet. Tyc.*

NEAPOLI, MDCCLIII.

Ex Typographia CATELLI LONGOBARDO, &
FELICIS DE SANCTIS.
SUPERIORUM FACULTATE.

Istiusmodi res dicere ornate velle, puerile est: plane autem, & perspicue expedire posse, docti, & intelligentis viri.

Cic. 3. de Fin.

PRÆCLARISSIMO VIRO,

Atque omni virtutum genere ornatissimo

MARCHIONI

BERNARDO TANUCCI

Neapolitani Regis a Secretis &c;

G. d. G.
S.



Aud equidem te, Vir Amplissime, interpellare, ac tua tempora negotiis, & Reipublicæ beneficio occupatissimi morari auderem, nisi me tam singularis illa humanitas tua, ac facilitas ultrò etiam timidos provocans impulisset, quam cognitio simul tuarum virtutum: eas enim tantas, ac tales semper existinavi, ut in animum induxerim, neminem te gratiorem patronum, vel judicem à p̄sūdicator inveniri. Integritatis porrò, justitiæ, ceterarumque
* 2 *animi*

animi tui doctum contemplatio , præcipue verò ^{supra dictas} quidam effectus necessitate quadam adegit , ut publicum aliquod admirationis meæ ederem testimonium . Non me latet (sapiens enim es) haud vano te laudum inurmure oblectari ; molestiæ tamen hujus , quam frequenter sufferre cogeris , tu ipse in causa es ; nam quum tuam dexteritatem in rebus gerendis maximam , profundam literarum peritiam , ac summam denique morum probitatem justis rerum extimatoribus occasionem præbeas admirandi , factum est , ut nec laudes possis effugere , nec jure debeas recusare ; eoque magis nec debes , quod hæc modo a me proficiuntur , a quo nulla inesse potest suspicio , tibi patrum obtrusum iri ; procul hinc ea absit opinio ; is enim non sum , qui tui favoris aurâ e turbido forentium pulvere emergere , atque ad dignitates evehi studeam ; neque insuper aliquo à te devinctus beneficio : imò , ne aliquâ in parte philosophico candori deesse videar (quo maximè viros honestos alloqui licet) illud ingenuè fatear , olim a te haud leves domus meæ perturbationes serenis nimium oculis fuisse observatas : quas quidem etsi a me sūt indignè sufferri

111
ferri plerisque non solum cordatioribus
viris, verum etiam aliquibus in Repu-
blicâ regendâ sublimem locum merenti-
bus visum fuerit, in eâ tamen semper
sententiâ perstiti, ut eas non certè a
te promotas agnoscerem, sed agro ani-
mo visas, quum opem ferre, & jam
oppressum in tuâ manu non erat suble-
vare: nullum enim justitiam ex te pa-
ti detrimentum agere ipsa etiam fateri
cogitur invidia; atque utinam quod in
dies a te providenter excogitatur ad
plerumque malorum Reip. reparationem
hominum ambitione, ac ~~quidam~~ non de-
strueretur: Quam mirum publica feli-
citas non augeretur! quot pro optimi
Regis, qui tantum Virum sibi a secre-
tis destinaverit, ac tuâ incolumitate
populi vota non susciperent, susceptis
non adderent, cumularent, funderent!
At ne modestiâ tuâ abusi videar & pa-
tientiâ, is enim es, qui nunquam de
laudibus auscultandis, sed promerendis
solicitus fuisti, dum aliâ ex parte onus
viribus meis impar suscepturum agno-
scerem, si singulas tuas laudes recensere
velim, eas malo potius tacere, quam
attaminare. Unum hoc oro, ut opuscu-
lum hoc, qualecunque id sit, dum ex
sur-

turbulentissimis negotiorum undis ad hæc studia humaniora, veluti ad portum deferri soles, leviter inspicias; eaque mente, ac benignitate, ut non quid ad te delatum sit attenderes potius, quam quo animo, quâve voluntate. Ea profectò Geometriæ pars, hic exponitur, cujus latissimus undequaque in totâ Mathesi campus diffunditur, ac tali Synteticâ Methodo pertractata, ut continuo ratiocinio mentem ad directionem conducatur: quem præcipuè Geometriæ scopum te admirari solere olim audiavi, & haud levi studio esse a te assecutum ad stuporem usque omnes adnotarunt, qui tuâ utuntur familiaritate. Accipe igitur opus hoc levioribus vigiliis lucubratum, tanquam specimen obsequii, quod tibi voveo & dico, illudque pro tuâ singulari animi mansuetudine evulgari sub tuo nomine patere, ut genium & vitam, quam a se non habet, a te consequatur. Quod si liceat sperare, nedum consequi, mirum quantum currenribus calcas addes, ut uberiores fructus post istas juventutis, & devotionis mee primitias hinc enascantur: Vale.

Emo Signore .

CAtello Longobardo, e Felice de Santis pubblici Stampatori, supplicando rappresenrano a V. Em., come desiderano di dare alle stampe un'Opera intitolata *Trigonometria Plana, & Sphærica Synopsis*; onde la supplicano di commetterne la revisione a chi meglio le parerà; e l'averanno a grazia, *ut Deus &c.*

Admodum Rev. P. Fr. Joachim Mayo Ordinis Predicatorum, Sacra Theologia Professor, & in Almo Collegio S. Thomæ Aquinatis ejusdem Ordinis Artium, & Mathematicæ Antecessor, revideat, & referat. Datum Neapoli hac die 3. mensis Junii An. 1753.

C. EPISC. CAJAC. VIC. GEN.

JULIUS NICOLAUS EP.ARC.CAN.DEP.

OPus, cui titulus: TRIGONOMETRIÆ PLANÆ, ET SPHÆRICÆ SYNOPSIS, quod Em. Tuz jussu percurri, nihil omnino exhibet Fidei, moribusque adversum: quin, Juventuti erudiendæ admodum profuturum spero; utpote ingeniosa, & expedita methodo institutum: Quare formis excudi; & ad commune commodum vulgari posse; deberique, censeo. Ex eodem almo D. Th. Collegio VIII. Kal. Jul. 1753.

Additissimus Famulus
Fr. Joachim Mayo Ord. Præd.

Attenta relatione D. Revisoris Imprimatur. Datum Neapoli hac 8. Julii 1753.

C. EPISC. CAJAC. VIC. GEN.

JULIUS NICOLAUS EP.ARC.CAN.DEP.

S. R. M.

S. R. M.

CAtello Longobardo, e Felice de Santis pubblici Stampatori, supplicando umilmente rappresentano a V. M., come desiderano di dare alle stampe un'Opera intitolata *Trigonometrie Plane, & Sphaerice Synopsis*; onde la supplicano compiacersi di commetterne la revisione a chi meglio le parerà, e l'averanno a grazia, *ut Deus &c.*

U. J. D. D. Nicolaus de Martino in Cathedra primaria Mathematicae Professor revideat, & in scriptis referat. Die 11. mensis Junii 1753.

NICOLAUS DE ROSA EP. PUTEOL.
INTER. CAP. MAJ.

Illustr., ac Rev. Domine.

LEgi librum, cui titulus *TRIGONOMETRIÆ PLANÆ, ET SPHÆRICÆ SYNOPSIS*; nihilque in eo offendi, quod regis juribus adversetur; immò argumentum mira claritate, ac brevitate pertractatum comperi. Itaque eum typis mandavi posse censeo. Datum Neapoli die 24 Junii 1753.

Humillimus, Additissimusque
Nicolaus de Martino.

Die 6. mensis Julii 1753. Neap.

Viso rescripto S. R. M. sub die 4. currentis mensis, & anni, ac retroscripta approbatione facta per Rev. D. Nicolaum de Martino de commissione Reverendi Regii Cappellani Majestatis, praevio ordine Praefata Regia Majestatis.

Regalis Camera Sanctae Clarae providet, decernit, atque mandat, quod imprimatur cum inserta forma praesentis supplicis libelli, & approbationis dicti revisoris; & in publicatione servetur Regia Pragmatica. Hoc suum &c.

CASTAGNOLA. FRAGGIANNI. PORCINARI.

Illustris Marchio Danza Praeses S. R. C. tempore subscripti. imped. Reg. Conf. Caput Aulae Gueta non interfuit. Reg. f. 51.

Carulli.

Mistellonus.

PRÆ-

P R Æ F A T I O.



Ullas unquam inter liberales artes locum sibi nobiliorem vendicasse , quam disciplinæ Mathematicæ in confesso est apud omnes , qui recta pol-

lent ratione : sive enim principiorum simplicitatem , evidentiam , ac certitudinem spectemus , sive utilitatem , eas merito mundo coævas , & a Deo primitus humano generi , tanquam divinæ sapientiæ particulam , distributas fuisse confitebimur . Porro illud jamdudum observatum est , scientias has cognitionem quandam exhibere mediam inter Physicam , & Metaphysicam , hoc est , inter Naturalem , ac supranaturalem ; dum enim in Materie versantur , rem eandem tanquam a materie sejunctam contemplantur . Jure igitur merito eas primum Juventuti ediscendas *Plato* proposuit , tanquam fundamentum nedum omnium scientiarum , verum etiam actionum humanarum : quæ enim humana actio a mentis deliberatione non dependet ? quæ autem deliberatio ratiocinium male , vel bene compositum non sequitur , aut quid a brutis homo ratiocinio

A

desti-

destitutus (esto anima immortalī præditus) nisi figura tantum , videtur differre ? Hinc sit oppido manifestum quare eos , quorum naturam nimis iracundia , amore , aut alia quavis animi passione vehementer laborantem ad ratiocinationem parum accomodatam videmus , vulgò brutales & barbaros appellamus , & despiciatui habemus : Ut igitur actiones hominum bonos sortiantur exitus , quibus humanam solemus felicitatem metiri , in eam metam præcipuè collimandum , ut mens ad bene ratiocinandum adsuescat . Habitum hunc quidem haud meliori pacto , quam ex divino Matheseos Thesàuro comparari posse tam sollemne est , & vetus , ut citatus Philosophus dixerit *μαθηματικά* esse *ἄλκτικά* , *ἀγωνα* , *παρακλητικά* , *ἐνεργητικά* , *μεταστροφικά νοήσεως* , *διανοίας* , *Θεῶς* , *ἀληθείας* , hoc est , talia esse , ut alliciant , impellant , excitent , erigant , convertant intelligentiam , ratiocinationem , contemplationem , veritatem .

Nihil est igitur cur miremur , quod omni ævo celebres plærique viri in iis excolendis , promovendisque tantoperè insudantes laudem haud mediocrem apud posteritatem promeruerint ; utpote qui abstrusiora hæc studia amplexi & mortales juvare , (quod summum decus)

& sibi

3

& sibi cum laude consulere visi sunt ,
quum ita præpeditam his disciplinis ju-
ventutem exegerint , ut aut nunquam ,
aut perrarò ab ejus illecebris sibi glau-
comam ob oculos objici siverint .

Propositum igitur hoc nostrum in hi-
sce Institutionibus concinnandis quale-
cunque sit , etsi de laude merenda non
certet , haud tamen improbatum iri con-
fidimus , eam enim triangulorum do-
ctrinam enucleatam , & facilem reddere
conati sumus , quæ nedum in Astrono-
micis paginam utramque facit , verum
in cæteris quoque matheseos partibus
haud magnos fas est sperare progressus
sine ejus plena cognitione . De cujus qui-
dem scientiæ præstantia etsi pluribus
præferri non oporteat , ne me eruditis
temerè vendibili vino , quod ajunt , he-
deram suspendere videar , aliqua tamen
in historiola de ejus progressu contexen-
da prælibare in animo est , ut Tyrones,
quod sibi ediscendum proponunt , intel-
ligant , & quanti doctrinæ hujus cogni-
tio facienda sit probè cognoscant .

Trigonometria satis ex ipso nomine ,
quid sibi velit innotescit ; *τριγωνος* enim
Triangulus , *μετρικη* verò *mensura* Græcis
est . Attamen , licet verbum ipsum ve-
tus sit , scientiæ hujus perfectionem re-
centioribus omnem debemus : Nam etsi

ab Euclide in Elem. plura de triangulis demonstrantur, quæ ad rem nostram conducunt, minimè tamen eam perficiunt; quippe in iis de inventione angulorum datis lateribus, vel laterum datis angulis, & permixtim, quod præcipuum Trigonometriæ munus est, ubique altum silentium.

Non me clam est *Hipparchum Rhodum*, *Theone* referente, chordarum in circulis doctrinam XII libris prosequutum esse; de quibus, licet ad ætatem usque nostram non pervenerint, hoc tamen ausim affirmare, illos majore prolixitate, quam utilitate scriptos fuisse. Hanc enim doctrinam post *Hipparchum* sibi curandam demandavit *Menelaus Romanus*, qui eam, aut paulò meliorem reddens, aut in concinniore formam reducens, sex libris complexus est, in quibus constructionem canonis edocere debuit, quod tamen paucis hodiè propositionibus præstare datum est. Hoc autem, quamvis ex hujus authoris scriptis, quorum nonnisi tres de Sphæricis triangulis extant, concludere nequeamus, abundè tamen comprobatur ex his, quæ *Ptolemæus* in cap. 1. sui *Almagesti* nobis reliquit ex *Menelao* desumpta, Trigonometriam ad id temporis mancasse ac imperfectam. Nam celebris hic
Astro-

5

Astronomus, qui circa an. 130 a Christo nato floruit, canonem chordarum composuit supposita chorda maxima, seu diametro in partes 120 divisa, ac per consequens fractiones trigésimas adhibens magnum calculi incomodum, & parum præcisionis consequutus est.

Post hæc prima Astronomiæ lumina Saraceni ad studium hoc animum adverterunt, rati eo perfectiores reddi posse calculos in Astronomia, quo scientia Triangulorum majorem exactitudinem nacta fuisset. Provinciam hanc igitur curantes opem aliquam Trigonometriæ attulerunt, considerando tantum semissec subtenfarum (eadem enim est ratio in semissecibus, ac in totis) novosque terminos inveniendos. Quibus inhærens vestigiis *Joannes Regiomontanus* Arabicis numerorum figuris usus, & quibus nunc utimur, radium in partes 60000.00 divisum assumpsit, ut sexagenariam veterum divisionem servando fractionum involutiones evitaret; nec ea divisione contentus, quum animadvertisset majus compendium fore si pro sexagenario numero unitas substitueretur, hinc tabulam confecit diviso radio in partes 100000.00 habita porro ratione ad triquetri latera, non ad subtenfas.

Regiomontani excepit *Georgius Joachi-*

chimus Rhæticus, qui, quum observasset Trigonometriam adhuc deficere, incredibili labore & studio in ea excolenda animum appulit, eamque ita perfecit, ut ferè absolutam reddiderit; divisa enim hypothenusa in part. 100000. 00000. 00000 relationem inventam inter eam, & latera tantum vero proximam exhibuit, ut citra errandi periculum pro verissima haberi possit. Nomina ab Arabibus inventa *sinus*, *sinus secundi*, *sagittæ*, &c. author hic immutavit, novaque substituit ex rei natura, in quo tamen Sectatores non habuit præter *Lucam Valentinum Ottonem*, qui ejus scripta, plurima de suo addens, post authoris mortem expensis *Friderici IV Electoris* excudit an. 1599 cum prolixo canone Sinuum, Tangentium, & Secantium ad radium 100000. 00000. Ex hoc Opere, quod *Palatinum* appellatum est, satis apparet, quantum laboris *Rhæticus* exantlaverit, atque ea prolixitate scriptum est, ut si ex illo ediscenda esset Tyronibus Trigonometria, pauci quidem extarent, qui utilissimæ scientiæ desertores non evaderent: Multum laudis tamen *Rhæticis* laboribus deberi agnoscimus, semperque agnoscet grata posteritas; non parum enim author hic ætatis suæ, ac facultatum

tatum in adornanda hæc scientia , & canone perficiendo consumpsit .

Ac in gratiam tanti viri , & ut suum unicuique tribuatur , illud hoc loco adnotabimus male *P. Dechales* , Mathematicum cæteroquin diligentissimum veritati litasse , quum scribit , sibi videri *Rhetici* Trigonometriam , & canonem ex mente *Vietæ* concinnatum esse ; quum potius contrarium possibile esse affirmare debuisset , si rem ad rectæ rationis regulas exegisset : Nam , ut ex *Valentino Othone* discimus in Præf. ad Opus *Palatinum* , ad hanc doctrinam locupletandam operam navabat *Rheticus* , antequam ad *Copernicum* migraret , apud quem occasionem habuit de hac re sollicitè perquirendi ; Si igitur hoc evenisse ponamus ad annum 1543 , in quo *Copernicus* rebus humanis valedicere coactus est , tunc temporis tertium ætatis annum agebat *Victa* ; cuius Canon Mathematicus an. 1579 lucem aspexit , tertio scilicet ab *Rhetici* morte : sane huius authoris scripta non prius an. 1596 edita fuere in Opere *Palatino* , exceptis *Ephemeridibus* recusis *Lipsiæ* an. 1550 ; attamen , quum *Rhetici* inventa & labores passim apud Mathematicos sui temporis laudibus efferrentur , possibile est ideam aliquam *Vietæ* innotuisse . Plu-

rima etiam de *Rhetici* morte fabulati sunt Authores ; quidam enim tradiderunt , eum , dum Martis motum ad calculum revocare desperaret , Genium invocasse , a quo abreptum capillitio ita ad terram deturbatum fuisse , ut ei caput illideretur : *Kepl.rus* verò narrat illum eandem ob causam desperatum spontè caput parietis allisisse : Nugæ ; revera enim nullam aliam sibi causam mortis intulit , quam quod in camera cubuerit recenter incrustata ; catharro igitur , & feбри violenti correptus intra paucos dies placidissimè absumptus est . At ne extra oleas eamus ad proposita revertamur .

Pari pede quo Trigonometria progrediebatur ad perfectiorem gradum tendebat Astronomia : *Nicolaus* enim *Copernicus* incomparabilis ingenii vir *Purbachii* observationibus , & *Regiomontani* scriptis præcipuè trigonometricis adjutus , *Rhetici* usus familiaritate ad majorem exactitudinem calculis perductis *Ptolæmi* placita parum cum Cælo consentireprehendit : resuscitato ergò *Philolai* Systemate majorem certitudinem nactus novam cæli faciem dedit posteris contemplandam ; quin & *Ptolæmæum* imitatus , tantum Trigonometriæ præmisit ex *Regiomontano* , quantum

tum Astronomicis suis libris sufficere
 judicavit . Post novum hunc Astrono-
 miæ periodum mirum quot præstantis-
 simi viri de ea præclare meriti insur-
 rexerint , qui , etsi *Rhæticæ* Canonem
 laudaverint , passimque eo uterentur in
 resolutione triangulorum , molestas ta-
 men ac longas operationes multiplican-
 di , dividendi , aut radices extrahendi
 e magnis numeris ægrè ferebant , ita
 ut rei huic medelam aliquam afferri po-
 tius desideraverint , quam consequi un-
 quam speraverint ; sed quid non eruit
 indefessum studium , aut labor impro-
 bus ! *Michael Stifelius* in *Arithmetica*
sua Integra edita an. 1544 primus om-
 nium progressionem Arithmeticas cum
 Geometricis conferendo varias earum
 proprietates , atque usus annotavit : hunc
 sequutus *Joannes Neperus* Theoriam hanc
 ad Trigonometriam applicavit , animad-
 vertens substitui posse numeros aliquos,
 quos *Artificiales* vocavit , quorum be-
 neficio multiplicationem & divisionem
 numerorum exprimentium Sinus , Tan-
 gentes , & Secantes simplici additione,
 vel subtractione absolvi posse : qua qui-
 dem in re quantum *Nepero* debeamus
 satis norunt *Matheseos* periti , eas sup-
 putationes exiguo temporis momento ab-
 solventes , quæ plures horas non extra
 om-

omnem erroris aleam prius infumebant .
Keplerus suè in Rudolphinis hujus in-
 venti primum *Justo Byrgio* sui tempo-
 ris non obscuri nominis Mathematico
 palmam tribuit ; at , quum hæc ex *Byr-*
gii scriptis videre non liceat , nulla enim
 hucusque edita sunt , etsi de *Kepleri* fi-
 de non dubitemus , tutò tamen affirma-
 re licet , primum ex *Neperi* libro no-
 vam hanc logarithmorum doctrinam de-
 monstrationibus munitam prodidisse . Li-
 ber hic excusus est Edinburgi continens
 doctrinam logarithmorum , ac eorun-
 dem pro Sinibus Canonem , in quo po-
 suit o pro logarithmo sinus totius , ut
 nequidem additionem , vel subtractio-
 nem pro multiplicatione , & divisione sub-
 stituere opus esset ; postea verò re dili-
 gentius considerata , ut apparet ex edi-
 tione posteriore Lugd. an. 1620 Cano-
 nem perfectiorem fore observavit , po-
 sito pro logarithmo unitatis o . Cæte-
 rum author in opere demonstrando per
 nimias ambages procedit , quum faci-
 lius & brevius res expediri potuerit ;
 nisi hoc potius fato quodam scientiarum ,
 aut melius , humanæ mentis limitationi
 tribuendum sit , ut rarò eidem & inve-
 nire datum sit , & perficerè .

Consilio *Neperi* ultimo excitatus *Hen-*
ricus Briggs canonem numerorum
 na-

naturalium ab 1 ad 20000, & ab 90000 ad 100000 construxit labore improbo in *Arithmetica Logarithmica* edita Goudæ an. 1624. Novam hujus *Arithmetice Briggianæ* editionem adornavit *Adrianus Ulacq* an. 1628 Goudæ, logarithmosq; numerorum naturalium ab 20000 ad 90000 supplevit; quin & indidem an. 1633. prodiit eodem autore *Canon Sinuum, & Tangentium Artificialium* ad singula dena secunda.

Quibus omnibus inventis quantum incrementi suscepit *Trigonometria* ex *Astronomia, Geographia, Nautica*, hisque affinibus scientiis ad perfectiorem gradum perductis abundè comprobatur. Nil igitur mirum est, quod hac doctrina veteres penè destituti immane quantum erraverint vel in prosthæresibus motuum determinandis, vel loco Apudum computando, vel in distantis Planetarum assignandis, vel in ambitu telluris mensurando, cæterisque aliis, quæ recentiorum *expensis* ad examen veritatis revocavit.

Plures quidem doctissimi viri post *Ulaq* materiem eandem tractandam susceperunt; quum autem messem omnem ita diligentius collectam invenerint, ut ne spicilegium fieri posse observaverint, animum eo adverterunt ut inventa meliori

liori forma digererent, faciliori methodo explicarent, ac clavis demonstrationibus ad Tyronum caput ad majora festinantium munirent. Scopum hunc porro, etsi multis propositus videatur, pauci tamen exactissime attigerunt; cui enim, ut de celebrioribus scriptis loquar, & quæ passim vulgi mathematicorum manibus insudant, *Clavii* mira illa prolixitas non nota, aut nimia *Tacqueti*, & *Schotti* brevitās? ille Tyro nem rigidis ad veterum normam demonstrationibus nauseat, hi memoriam potius Trigonometriæ in proprium usum concinnasse videntur. In *Dechalesii* tractatu major brevitās desideranda est, quum supervacanea multa, & inutilia ex Sphæricis haurire opus sit. In Scholis passim Epithome quædam Trigonometrica circumfertur Patavii excusa; Opusculum quidem ita male digestum, & ordinatum, ut mihi videatur Tyrones potius in desperationem, quam in spem unquam Trigonometriam ediscendi conjicere; præterquam enim quod plurima ex Sphæricis demonstrata supponat, antiquiori methodo Secantibus utitur, nec regula quidam Universalis; ut in casu quolibet Trigonometriæ resolvendo librum Tyro consulere, & apud se habere teneatur. Apud Anglos

glos meliori successu edidit patrio
 idiomate Trigonometriam *Richardus*
Norwood, problemata omnia solvens per
 regulas Catholicas a *Nepere* traditas.
 Ibidem etiam *Wilhelmus Hutton* do-
 ctrinam planæ, ac sphæricæ Trigono-
 metriæ typis mandavit anglico sermone
 non improbanda, etsi prolixus videatur
 in Exemplis, quæ licet meo iudicio ne-
 cessaria sint, iis tamen ita parcè uten-
 dum est, ut non ulteriorem requirant
 in Tyrone cognitionem, quam ratio
 studiorum hucusque permittere videatur;
 quoties enim hic Trigonometriæ ope-
 ram navat, ut plurimum ad Astrono-
 mica, Nautica, Gnomonica, &c. po-
 stea descendit, ex quarum Scientiarum
 profundiori Theoriâ petita si quis exem-
 pla candidatis objiciet, quippè ignotum
 explicans per ignotius, male illum bo-
 næ methodo consuluisse putandum est.
 Nemo omnium Trigonometriam utram-
 que ad discipulorum captum benè concin-
 navit, quam *Christianus Wolfius* non si-
 ne honore in Mathematicis nominandus,
 in suis Elementis: vir summus perspi-
 cuitatem miram cum brevitate conjun-
 git, nihil quod ad rem faciat omittit,
 ac singula miro illo suo ordine perse-
 quitur; ut si scorsim ea edidisset paulò
 fusiore explicationem addens, ne Ty-
 rones

rones ex præmissis elementis multa inquirere cogantur, ac de sphæricis tantum attigisset quantum Trigonometriæ opus est exempla adjungens, ac tabulas, quas Lipsiæ exactissimas edidit, certe in hujus scripti genere nihil aliud reponi melius posse fateri oporteret.

Otio igitur me abusum dicent eruditi, & crambem, ut ajunt, recoquere, postquam ad operis vestibulum pervenerunt titulumque inspexerunt. Verum enim verò si aliquantisper tractatum hunc evolvere non dedignentur haud prorsus inutilem pro Tyronibus judicaturum spero. Brevitatem enim ubique ita cum Methodo conjungi curavimus, ut nec difficiliora jejune nimis proponantur, nec facilia cum verborum superfluiditate; exempla & generalia, & peculiaria adjunximus, ut nedum ingenium discipulorum convincatur, verum etiam illustretur; tabulas insuper addidimus *Sinum*, & *Tangentium Artificialium*, quas, ut exactissimæ prodirent, ex diligentioribus editionibus inter se collatis transcripsimus; Logorum etiam differentias addidimus, quorum beneficio secundæ minutæ inquiri possint. Tabulam ordinariam Logorum Numerorum Naturalium ab 1 ad 10000 transcriptam sufficere judicavimus, quum
per

per eam tantum ex doctrina in Tractatu logarithmorum exposita facile logarithmus numeri cujuscunque supra 10000 comparari possit.

Cæterum non dubito fore plerisque, qui methodum nostram, præcipuè in Sphæricorum affectionibus demonstrandis, utpote laxiorem minus probent, quum plurimas proprietates, quæ ab aliis magno Propositionum numero ad rigidissimam veterum normam explanantur, ex definitionibus in Corollaria deduximus: at de hac opinione susque deque; non enim in hoc tractatu scribendo propositum fuit, ideam rigorosæ Veterum demonstrationis Tyronum animis ingerere, verum simplicem doctrinæ hujus cognitionem exhibere, qua ad majoris momenti scientias acquirendas manuducantur; atque hoc eo modo præstare conati sumus, ut omnia, breviori tamen quoad potuit via, demonstramus, ne nobis, quod plerisque Geometrarum, jure vel injuria haud definio; vitio vertatur, quod *multa probent, quæ probatione non indigent, & longis ambagibus verborum ea explacent, quæ per se clara & evidentiæ sunt, ut quasi fucum facientes veritati eam tali modo morosam reddant, ac deturpatam*. Quod si optimi rerum estim-

ma-

matores , non ii verò qui ex titulis tantum judicare consueverunt , librum hunc nil , præter gloriolam quandam , quod juvare tentaverit , consequitur affirmant , squallore & pulvere oblitus cariolo situ jaceat sinimus , & in bonam partem accipimus.



LIBER

LIBER PRIMUS¹⁷

Trigonometriam Planam, & Logarith-
morum doctrinam complectens.

C A P U T I.

*De Constructione Canonis Trigo-
nometrici.*

DEFINITIO I.

§. 1.



U^m triangulus quilibet ex
tribus lateribus constet tres
angulos includentibus, trian-
gulum omnem promiscuè sex
partes habere dicimus, tres
angulos scilicet ac tria latera.

DEFINITIO II.

§. 2. *Trigonometria* est Scientia, quæ agit de
mensura partium Trianguli, hoc est, quæ da-
tis tribus unius Trianguli partibus reliquas
docet determinare. Speciatim *Trigonometria*
plana audit, si de Triangulo tribus rectis li-
neis composito in superficie plana agit; (*Fig. 9*)
sphærica verò, si de triangulo tribus arcibus
circularibus constanti in superficie sphaeræ.
(*Fig. 27*)

DEFINITIO III.

§. 3. Si circuli cujuslibet peripheriam divi-
sam concipimus in partes 360, unaquælibet
B pars

pars dicetur *gradus*; si ulterius pars hæc, sive *gradus* dividatur in partes 60, unaquælibet dicetur *minutum primum*; quod si sit etiam in 60 partes divisum, emergunt *minuta secunda*; atque ita semper *minutum secundum* dividitur in 60 *tertia*; *tertium* in 60 *quarta*, &c. in infinitum. Ita verò notantur $4^{\circ} 50' 36'' 48''' 71''''$ &c. hoc est quatuor gradus, quinquaginta minuta prima, sex & triginta minuta secunda, 48 minuta tertia, 7 quarta, 11 quinta, &c. Circuli igitur quadranti competunt 90° , seu 5400 minuta prima, seu 324000 minuta secunda &c.

DEFINITIO IV.

Fig. 1

§. 4. *Mensura*, sive *quantitas anguli rectilinei* dicitur arcus circuli descripti ex centro dati anguli ad quodlibet intervallum. Ex.gr. mensura anguli BAD est arcus BD; anguli verò NAD arcus ND; ita ut si arcui BD competant gradus 45, arcui verò KBND gradus 90, & arcui ND gradus 30, angulum BAD duplum, & NAD triplum dicimus anguli KAD.

DEFINITIO V.

§. 5. *Subtensa*, seu *chorda* arcus alicujus dicitur recta ea, quæ inter hujus arcus extremitates ducitur: Ex.gr. recta DB est *chorda* arcus DNB; GB vero est *chorda* arcus GDB. Quoniam autem diameter in circulo est maxima omnium rectarum, quæ in eo duci possunt, * patet ratio cur diameter dicatur etiam *chorda*, seu *subtensa maxima*.

* El.1.3Pr.15

DEFINITIO VI.

19

§. 6. *Sinus rectus* arcus alicujus est dimidium chordæ dupli arcus dati. Ex. gr. *sinus rectus* arcus BD est recta BC, quæ est semissis chordæ BG arcus BDG dupli arcus dati BD. Porro radius AD ductus per punctum C perpendiculariter insitit chordæ BG, * ac proinde etiam definiri potest *sinum rectum* esse rectam ductam ab una extremitate arcus dati perpendiculariter ad radium ductum ad alteram extremitatem ejusdem arcus: recta igitur DE tali pacto ducta est sinus rectus arcus BD, ac per consequens æqualis BC. * El. 1.3 Pr. 3

COROLLARIUM.

§. 7. Ex definitione infertur dimidium BC chordæ BG esse nedum sinum rectum arcus BD, verum etiam arcus BHF, complementi scilicet prioris arcus ad semicirculum; recta enim BG est chorda communis arcui BDG, & arcui BHFG complemento ad circulum.

DEFINITIO VII.

§. 8. *Sinus totus*, seu *maximus* dicitur radius AK; est enim maximus omnium sinuum, quum sit dimidium diametri, seu chordæ maximæ, quæ in circulo duci potest.

DEFINITIO VIII.

§. 9. *Sinus versus*, seu *Sagitta* est portio diametri, quæ intercipitur a sinu recto & arcu circuli. Ex. gr. sinus versus arcus BD est recta CD; arcus vero KBD sive quadrantis est

B
AD,

AD ; scilicet in quadrante sinus versus AD æquatur sinui recto KA , & ambo sunt radii.

COROLLARIUM I.

- §. 10. Sit modo arcus BD bisectus in N , ducta chorda BD , triangula duo BCD ARD sunt æquiangula , præter enim rectos ad C & R habent CDB comunem ; proinde erit CD ad DB , ut DR ad AD * , atque etiam CD ad $\frac{1}{2}$ DB ita DR ad $\frac{1}{2}$ AD * , erit ergo rectangulum CD in $\frac{1}{2}$ AD æquale rectangulo DR in $\frac{1}{2}$ DB * , hoc est , quadrato DR : Sinus igitur versus cujuscvis arcus ductus in dimidium radii æquatur quadrato sinus dimidii ejusdem arcus .
- * El. I.6 Pr. 4
- * El. I.5 Pr. 15
- * El. I.6 Pr. 16

COROLLARIUM II.

- Fig. 2 §. 11. Sint duo arcus EDC , ED , quorum differentia DC si bifariam secetur in B , quum summa datorum arcuum EDC , ED sit 2 DE plus DC , semisumma horum arcuum erit arcus EB . Ductis itaque in radium perpendicularibus DF BH CG , recta DA , chorda DC , & ex centro radio KB , efformantur triangula duo DSO BHK æquiangula , præter enim rectos ad S & H habent angulos SOD BKH æquales * , ergo etiam anguli KBH CDA sunt æquales , & ob rectos ad A & H etiam triangula DAC BKH æquiangula ; proinde erit BH ad AD ut KB ad CD , sive ut $\frac{1}{2}$ KB ad $\frac{1}{2}$ CD , unde rectangulum BH in $\frac{1}{2}$ CD æquatur rectangulo AD in $\frac{1}{2}$ KB ; hoc est , quum AD æquetur CF , differentia sinuum veriorum duorum arcuum ducta in dimidium radii æqualis est rectangulo sub sinu semisum-
- El. I.1 Pr. 27
- mæ

mæ & sinu semidifferentiæ eorundem arcuum :

DEFINITIO IX.

§. 12. *Sinus complementi, sinus secundus*, si- Fig. 1
 ve *Co-sinus* est sinus illius arcus, qui prioris
 dati est complementum ad quadrantem. Ex.
 gr. arcus dati BD cosinus est recta MB, quæ
 est sinus arcus KB complementi ad quadran-
 tem: pari ratione recta BC dici potest cosinus
 arcus KB si ad hunc referatur, arcus enim
 BD est complementum ad quadrantem arcus
 KB. Hic denuò adnotandum est, rectam MB
 nedum esse cosinum arcus BD, verum etiam
 arcus BHF, qui cum priore conficiunt semi-
 circulum:

DEFINITIO X:

§. 13. *Tangens* alicujus arcus dicitur recta
 ea, quæ unam ex illius extremitatibus contin-
 git, comprehensa inter punctum contactus, &
 punctum concursus cum linea ex centro cir-
 culi ducta per alteram extremitatem. Ex. gr.
 recta DL est *tangens* arcus DB, sive anguli
 DAB; recta DI est *tangens* arcus DN, sive
 anguli DAI, &c. *Tangens secunda*, sive *Co-*
tangens dicitur tangens arcus, qui prioris est
 complementum ad quadrantem. Ex. gr. recta
 KP est *tangens secunda* arcus BD; recta KS
tangens secunda arcus ND, &c. Ubi etiam
 animadvertendum est, rectam DL nedum esse
 tangentem arcus BD, verum etiam arcus BKF
 complementi ad semicirculum; atque ita co-
 tangens KP communis est arcui BD, & arcui
 BKF.

DEFINITIO XI.

§. 14. *Secans* alicujus arcus est recta ea, quæ ducitur a centro circuli per extremitatem illius arcus, terminata ad tangentem ejusdem arcus. Ex. gr. recta AI dicitur *secans* arcus DN, recta verò AL, *secans* arcus BD, &c. *Secans secunda*, sive *Co-secans* est *secans* arcus, qui prioris est complementum ad quadrantem. Ex. gr. recta AS est *Co-secans* arcus DN; recta AP *co-secans* arcus BD &c. Pari modo ac supra diximus *secans* AI arcus DN est etiam *secans* arcus NKF, qui est complementum ad semicirculum; ac proinde etiam *co-secans* AS arcus DN est communis arcui NKF.

COROLLARIUM.

§. 15. Ex definitionibus Sinuum, Tangentium, & Secantium liquidò inferitur, latera AC BC trianguli cujuscunque rectanguli ABC, si hypotenusa AB tanquam radius assumatur, esse sinus angulorum oppositorum: si verò ex alterutro laterum, puta AK, trianguli AKS fiat circulus, hypotenusam AS esse secantem, latus verò reliquum KS tangentem anguli ad centrum.

DEFINITIO XII.

§. 16. *Canon Trigonometricus linearis* dicitur Tabula, in qua ad singulos gradus & minuta prima quadrantis atque etiam secunda, si majorem præcisionem desideres, inveniuntur dispositi Sinus, tangentes, & secantes in iisdem partibus, in quibus divisus assumitur circuli radius. Vulgo in Tabulis ordinariis divisus assu-

sumitur in partes 10000000, & pro²³ calculis expediendis sufficere judicatur; etsi pro Canone construendo, ut exactior evadat, saltem partium 100000. 00000 assumi debeat; quorum omnium ratio inferius patebit. Quum autem Trigonometria omnis a Canonis constructione dependeat, eam hic breviter primum edocere conabimur.

P R O B L E M A I.

Invenire quot partes earum, in quas radius AF Fig. 3. divisus assumitur, contineat latus FB trianguli æquilateri circulo inscripti.

§. 17. Quoniam arcus, cujus subtensa est latus trianguli æquilateri, est tertia pars totius peripheriæ circuli, continebit gr. 120; ac proinde si is dividatur æqualiter in puncto C, arcus CB erit gr. 60, qui simul cum arcu FB conficiunt arcum FBC gr. 180; hoc est, arcus FBC est semicirculus, ac per consequens ductâ rectâ FC, ea erit circuli diameter, & angulus CBF rectus *. Ergo quadratum rectæ BF æquatur quadrato rectæ FC dempto tamen quadrato rectæ BC *; BC vero æquatur radio CA, subtendit enim sextam peripheriæ partem *. Si igitur concipiatur radius divisus in partes 100000. 00000, erit diameter FC 200000. 00000, cujus quadratum est 400000. 00000. 00000. 00000 a quo numero si subtrahatur quadratum ex BC 100000. 00000. 00000. 00000 remanet quadratum ex FB 3. 00000. 00000. 00000. 00000, cujus radicit quadrata est latus quæsitum FB 1732050-8075. Q. e. i. & d.

*El. 1.3. Pr. 31

*El. 1.1. Lr. 47

*El. 1.3. Pr. 15
Cor. 1

COROLLARIUM.

§. 18. Dimidium ergo chordæ FB, hoc est, 8660254028 dat sinum rectum arcus 60° (§. 6.)

PROBLEMA II.

*Invenire latus quadrati CB in eisdem
partes radii.*

Fig. 4

§. 19. Quoniam BC est latus quadrati, erit angulus BAC rectus; ergo quadratum ex BC æquatur quadratis simul ex AC & AB, hoc est, duplo quadrati radii, a quo radix extracta exhibet latus BC quæsitum. Duplum quadrati radii est 200000. 00000. 00000. 00000, cujus radix 14142135623 est latus BC. Q. e. i. & d.

COROLLARIUM.

§. 20. Dimidium ergo lateris CB, hoc est, 7071067812 est sinus arcus 45° (§. 6.)

PROBLEMA III.

*Invenire latus Decagoni in eisdem
partes radii.*

§. 21. Latus ED decagoni circulo inscripti cujus centrum A & radii AD AE sit productum in F, ita ut pars DF radio AD æqualis: connectantur puncta A & F recta AF: Quoniam ED est latus decagoni, erit arcus sive angulus DAE 36° , & angulus ADE æqualis angulo AED 72° , ac proinde angulus ADF 108° ; angulus igitur DFA, qui æquatur angulo

gulo DAF ex constr. est 36° , ac per consequens æqualis angulo DAE : quoniam obrem triangula duo AFE ADE sunt similia *, unde erit EF ad AE ut AE ad ED, hoc est, rectangulum ex EF in ED æquatur quadrato AE, five DF; si ergo DF dividatur æqualiter in G ut fiat FG vel GD semiradio æqualis, erit, æqualibus æqualia addendo, rectangulum ex EF in ED cum quadrato GD æquale quadrato FD cum quadrato GD; sed rectangulum ex EF in ED cum quadrato GD æquatur quadrato ex GE*, ergo quadratum ex GE æquatur quadrato FD cum quadrato GD; unde etiam radix quadrati GE, hoc est, recta GE æquatur radici quadratorum simul sumptorum FD & GD, quare, si ab æqualibus his æqualem partem GD auferas, remanet latus decagoni DE æquale radici quadratorum simul sumptorum FD GD minus semiradio GD. Hisce positis summa quadratorum radii & semiradii est 25000. 00000. 00000. 00000, cujus numeri radix dat rectam GE 11180339887; quare si ab ea subtrahatur semiradius GD remanet DE latus decagoni quæsitum partium 6180339887. Q. e. i. et. d.

COROLLARIUM.

§. 22. Dimidium igitur lateris decagoni dat sinum 3090169944 arcus 18° .

PRO-

PROBLEMA IV.

Dato alicujus arcus sinu DF in partes radii invenire sinum complementi, sive cosinum DE in easdem partes.

Fig. 5 §. 23. Ob DF CA, itemque ED AB parallelas (§. 6.) erit AF æqualis DE; quum verò quadratum ex radio AD æquetur quadratis simul ex AF & DF, si a quadrato radii auferatur quadratum ex sinu dato DF, remanet notum quadratum AF, cujus radix est sinus DE complementi quæsitus. Ex. gr. sit arcus DB 18° , hujus sinum DF invenimus (§ præc.) 3090169944, si ergo hujus quadratum a quadrato radii dematur, remanet quadratum, cujus radix 9510363163 exprimet sinum arcus 71° , sive cosinum arcus 18° quæritum. Eodem modo invenietur cosinus arcus 60° , hoc est, sinum 30° esse partium 5000000000, radii scilicet dimidium. Cosinus autem 45° idem est ac sinus ejusdem arcus. Q. e. i. et d.

COROLLARIUM.

§. 24. Sinus versus alicujus arcus statim obtinetur si sinus complementi a radio detrahatur; nam FB est differentia radii AB, & sinus DE complementi arcus DB: Si ergo DB sit arcus 18° , erit FB partium 6909830056. At sinuum versorum contemplatio ferè nullius est usus in nostra Trigonometria.

PRO-

PROBLEMA V.

27

Dato alicujus arcus sinu DF in partes radii invenire finum DK dimidii arcus dati in easdem partes.

§. 25. Ducatur recta GD; quum triangula duo DGB DFB sint æquiangula, angulus enim ad B communis, & angulus DFB æqualis BDG utpote recti, erit GB ad DB ut DB ad FB*, hoc est, quadratum ex chorda arcus, cujus dimidii quæritur finus, æquatur rectangulo ex diametro in sinum versum; proinde quum sinus versus innotescat dato sinu DF (§. præc.) hunc multiplicando per duplum radii & ex producto radicem extrahendo, habetur chorda DB, cujus dimidium est finus DH quæsitus. Ex. gr. sit DF finus arcus DB 72° partium 95105651163 (§. 23.) erit ejus cosinus DE 3090169944 (§. 22.), & sinus versus FB 690833056 (§. præc.) quo multiplicato per duplum radii & ex producto radice extracta, prodit finus DH 36° partium 5877852523. Q. e. i. et d.

PROBLEMA VI.

Invenire latus quindecanguli in easdem partes radii.

§. 26. Circulo inscribantur triangulum æquilaterum CDF, & pentagonum CIEGH* quoniam arcui CID correspondent 120° , & arcui CIE 144° , horum differentia DE erit 24° , hoc est, ducta recta DE, hæc exhibebit latus quindecanguli; gradus enim 24 est decima quinta pars totius peripheriæ. Ducantur ulterius

Fig. 6.

* El. I. 4. Pr. 2

© 11

ulterius radii AE AD, & ex puncto E in
 latus DK excitetur perpendicularis EN: arcus
 CID CHF sunt æquales, item arcus
 CIDE CHFG ex const. ex qua æqualitate
 consequitur latera DF EG esse parallela, at-
 que ab radio AB ad ea perpendiculariter du-
 ctio bisecari*: si ergo a quadrato radii AE aufera-
 tur quadratum lateris EL (§. 25.) inventi, rema-
 net pro quadrato AL 65450849729618239516
 cujus radix est AL 8090169944. Eodem ra-
 tiocinio a quadrato radii DA dempto quadra-
 to lateris DK (§. 18.) inventi, remanet
 quadratum AK 25000000014625202631, cu-
 jus radix est AK 5000000001. Notis inde
 rectis AL & AK si hæc ab illa auferatur,
 remanet KL five NE 3090169943. Item, si
 latus EL ab DK auferatur, remanet DN 27-
 82401515; quadrata denique ex DN & NE
 simul sumpta dabunt quadratum DE 172909-
 08467294918474, a quo si radix extrahatur,
 habetur latus quindecanguli DE quæsitum par-
 tium 4158233815. Q. e. i. et. d.

C O R O L L A R I U M.

§. 27. Dimidium itaque chordæ DE exhibet
 finem 2079116908 arcus 12°.

S C H O L I O N.

§. 28. Inventis ex Probl. I II III & VI fi-
 nibus arcuum 60°, 45°, 18°, & 12°, atque
 horum complementis per Probl. IV, plures alii fi-
 nus erui possunt beneficio Probl. IV & V. si nem-
 pe continuo datorum finium inveniantur semisses
 & complementorum semisses, ut in Tabulis I II
 III & IV factum videre est. Ex. gr. in Tabula
 I ex

I ex dato *finu* arcus 60° *inventiuntur* per *Probl.*
V *finus* continui *semisium* 30° , 15° , $7^\circ 30'$,
 $3^\circ 45'$, qui *ultimus* arcus non *ultra* *dividitur*
ne in *secunda* *minuta* *incurratur*: horum *semis-*
ium *complementa* sunt 60° , 75° , $82^\circ 30'$,
 $86^\circ 15'$, quorum *finus* *habentur* ex *Probl.* *IV*;
atque *ita* *semper*, quoad *fieri* *potest*, *semisibus*
semisium, horum *complementis*, *complementorum-*
que *semisibus* *assignantur* *finus*. Qui *omnes* *in-*
venti *si* *debito* *ordine* *disponantur*, *ita* *ut* *proxi-*
mè *maior* *minor* *subsequatur*, prouti *in* *Tabel-*
la *V* *sunt* *dispositi*, *numerabimus* *finus* *numero*
120, non *exceptis* *iis* *inventis* (§§ 18, 20, 22)
de *radio*, *sefe* *invicem* $45'$ *superantes*. Nunc
resiat, *ut* *videamus* *quomodo* *finus* *alios* *inter-*
medios *reperire* *possimus*.

T A B. I.

Sinuum qui oriuntur ex *finu* gr.60.

Sem.arc. 60°	Sinus	Semisium complem.	Sinus
30°	50000.00000	60°	86602.54038
15°	25881.90451	75°	96592.58263
$7^\circ 30'$	13052.61922	$82^\circ 30'$	99144.48614
$3^\circ 45'$	6598.36489	$86^\circ 15'$	99785.89232
Sem. arc. 75°	Sinus	Semisium complem.	Sinus
$37^\circ 30'$	60876.14290	$52^\circ 30'$	79335.33403
$18^\circ 45'$	32143.94653	$71^\circ 15'$	94693.01295
Sem.ar. $82^\circ 30'$	Sinus	Semisium complem.	Sinus
$41^\circ 15'$	65934.58151	$48^\circ 45'$	75183.98075
Sem.ar. $52^\circ 30'$	Sinus	Semisium complem.	Sinus
$26^\circ 15'$	44228.86902	$63^\circ 45'$	89687.27415

T A B. II.

Sinuum qui oriuntur ex sinu gr. 45.

Sem. ar.	45°	Sinus	Sem. com.	Sinus
22°	30'	38268.34323	67° 30'	92387.95325
11°	15'	19509.03220	78° 45'	98078.52804
Sem. ar.	67° 30'	Sinus	Sem. com.	Sinus
33°	45'	55557.02330	56° 15'	83146.96123

T A B. III.

Sinuum qui oriuntur ex sinu gr. 18.

Sem. arc. 18°	Sinus	Sem. compl.	Sinu
9°	15643. 44650	81°	98768. 83406
4°	7445. 98957	85° 30'	99691. 7337
2°	3925. 98157	87° 45'	99922. 90362
Sem. arc. 72°	Sinus	Sem. compl.	Sinu
36°	58778. 52523	54°	80901. 69944
Sem. arc. 81°	Sinus	Sem. compl.	Sinu
40° 30'	64944. 80483	49° 30'	76040. 59656
20° 15'	34611. 70571	69° 45'	93819. 13359
Sem. arc. 85° 30'	Sinus	Sem. compl.	Sinu
42° 45'	67830. 07455	47° 15'	73422. 25094
Sem. arc. 54°	Sinus	Sem. compl.	Sinu
27°	45399. 04997	63°	89100. 65242
13° 30'	23344. 53638	76° 30'	97236. 09204
6° 45'	11753. 73974	83° 15'	99306. 84569

Sem.

Sem. arc. $49^{\circ} 30'$			
$24^{\circ} 45'$	41865. 97375	$65^{\circ} 15'$	90814. 31758
Sem. arc. 63°			
$31^{\circ} 30'$	52249. 85641	$58^{\circ} 30'$	85264. 01643
$15^{\circ} 45'$	27144. 04499	$74^{\circ} 15'$	96245. 52364
Sem. arc. $76^{\circ} 30'$			
$38^{\circ} 15'$	61909. 39493	$51^{\circ} 45'$	78531. 69309
Sem. arc. $58^{\circ} 30'$			
$29^{\circ} 15'$	48862. 12415	$60^{\circ} 45'$	87249. 60071

T A B. I V.
Sinuum qui oriuntur, ex ſinu gr. 12.

Sem. ar. 12°	Sinus	Sem. compl.	
6°	10452. 84633	84°	99452. 18954
3°	5233. 59562	87°	99862. 95347
$1^{\circ} 30'$	2617. 69483	$88^{\circ} 30'$	99965. 73250
$45'$	1308. 95956	$89^{\circ} 15'$	99991. 43276
Sem. ar. 78°			
39°	62932. 03910	51°	77714. 59614
$19^{\circ} 30'$	33380. 68595	$70^{\circ} 30'$	94564. 14911
$9^{\circ} 45'$	16934. 95038	$80^{\circ} 15'$	98555. 60590
Sem. ar. 84°			
42°	66913. 06063	48°	74314. 48255
21°	35836. 79495	69°	93358. 04265
$10^{\circ} 30'$	18223. 55255	$79^{\circ} 30'$	98325. 49076
$5^{\circ} 15'$	9150. 16187	$84^{\circ} 45'$	99580. 49276
Sem. ar. 87°			
$43^{\circ} 30'$	68835. 45757	$46^{\circ} 30'$	72537. 43710
$21^{\circ} 45'$	37055. 74375	$68^{\circ} 15'$	92880. 95529

S.a.

S.ar.88° 30' 44° 15'	69779 04598	45° 45'	71630. 19434
Sem.ar. 51° 25° 30' 12° 45'	43051. 10968 22069. 34350	64° 30' 77° 15'	90258. 52843 97534. 23205
S.ar.70° 30' 35° 15'	57714. 51900	54° 45'	81664. 15551
Sem.ar.48° 24°	40673. 66431	66°	91354. 54576
Sem. ar.69° 34° 30' 17° 15'	56640. 62369 29654. 15750	55° 30' 72° 45'	82412 61886 95301. 92444
S.ar.79° 30' 39° 45'	63942. 90010	50° 15'	76884. 18321
S.ar.46° 30' 23° 15'	39474. 38564	66° 45'	91879. 12101
S.ar.64° 30' 32° 15'	53361. 45159	57° 45'	84572. 78217
Se. ar.66° 33° 16° 30' 8° 15'	54463. 90350 28401. 53447 14349. 26220	57° 73° 30' 81° 45'	83867. 00579 95881. 97349 98265. 13868
S.ar.55° 30' 27° 45'	46565. 45203	67° 15'	88988. 76374
Sem.ar.57° 28° 30' 14° 15'	47715. 87602 24615. 32930	61° 30' 75° 45'	87881. 71126 96923. 02097
S.ar.72° 30' 36° 45'	59832. 46006	53° 15'	80125. 38127
S.ar.61° 30' 30° 45'	51129. 30861	59° 15'	85942. 64115

1	0. 45	21	15.45	41	30.45	61	45.45	81	60.45	101	75.45
2	1. 30	22	16.30	42	31.30	62	46.30	82	61.30	102	76.30
3	2. 15	23	17.15	43	32.15	63	47.15	83	62.15	103	77.15
4	3. 0	24	18. 0	44	33. 0	64	48. 0	84	63. 0	104	78. 0
5	3. 45	25	18.45	45	33.45	65	48.45	85	63.45	105	78.45
6	4. 30	26	19.30	46	34.30	66	49.30	86	64.30	106	79.30
7	5. 15	27	20.15	47	35.15	67	50.15	87	65.15	107	80.15
8	6. 0	28	21. 0	48	36. 0	68	51. 0	88	66. 0	108	81. 0
9	6. 45	29	21.45	49	36.45	69	51.45	89	66.45	109	81.45
10	7. 30	30	22.30	50	37.30	70	52.30	90	67.30	110	82.30
11	8. 15	31	23.15	51	38.15	71	53.15	91	68.15	111	83.15
12	9. 0	32	24. 0	52	39. 0	72	54. 0	92	69. 0	112	84. 0
13	9. 45	33	24.45	53	39.45	73	54.45	93	69.45	113	84.45
14	10.30	34	25.30	54	40.30	74	55.30	94	70.30	114	85.30
15	11.15	35	26.15	55	41.15	75	56.15	95	71.15	115	86.15
16	12. 0	36	27. 0	56	42. 0	76	57. 0	96	72. 0	116	87. 0
17	12.45	37	27.45	57	42.45	77	57.45	97	72.45	117	87.45
18	13.30	38	28.30	58	43.30	78	58.30	98	73.30	118	88.30
19	14.15	39	29.15	59	44.15	79	59.15	99	74.15	119	89.15
20	15. 0	40	30. 0	60	45. 0	80	60. 0	100	75. 0	120	90. 0

P R O B L E M A VII.

Datis in partes radii finibus NS MR arcuum Fig. 4

SL RSL, quorum differentia RS non est

major 45°, invenire in easdem partes

finum OP arcus alicujus in-

termedii dati PSL.

§. 29. Ex puncto S ducatur ad MR per
pendicularis ST; quoniam ex hyp. arcus RS
minimus, nempe non major 45°, assumi po-
test absque sensibili errore tanquam linea re-
cta; ac proinde triangula duo SKP STR e-
runt similia; hæc analogia igitur institui po-
test, ut RS 45° ad TR differentiam duorum

C finuum

sinuum datorum, ita differentia SP duorum arcuum SL RSL quæ etiam nota est, ad KP; unde, quum tria prima sint nota, quartum non ignorari necesse est; quod sinui minori NS junctum dat sinum quæsitum OP. Ex. gr. sit NS 77714. 59614 sinus nempe 51° ; MR verò 78131. 69309 sinus $51^{\circ} 45'$; quæritur autem sinus OP arcus PSL $51^{\circ} 30'$; fiat ut RS 45' ad TR 817. 09695 differentiam, ita SP 30' ad PK, quod ex regula aurea erit 54473130, & additum sinui NS dat sinum OP 78259. 32744. Q. e. i. et d.

SCHOLION I.

§. 20. Ex Problemate hoc fuit methodus, qua ad singulos gradus, & minuta primæ quadrantis inveniri possint correspondentes sinus. Quærantur enim primo inter sinus inventos arcuum, quorum differentia est 45', duo alii sinus, quorum arcus a prioribus differant tantum 15'. Ex. gr. inter 45' & $1^{\circ} 30'$ inveniantur sinus arcuum 1° & $1^{\circ} 15'$; inter $1^{\circ} 30'$ & $2^{\circ} 15'$ inveniantur sinus arcuum $1^{\circ} 45'$ & 2° , & sic de singulis; qui omnes sinus, computatis iis qui inveniantur inter 45' & 0, nempe sinus arcuum $15'$ & $30'$, sunt numero 240, & prioribus 120 inventis adjuncti, efficiunt sinus numero 360, quorum arcus differunt 15'. Inter hos quærantur duo alii sinus, quorum arcus differant tantum 5', ex. gr. inter 45' & 1° inveniantur sinus arcuum $50'$ & $55'$; inter 1° & $1^{\circ} 15'$ inveniantur sinus arcuum $1^{\circ} 5'$ & $1^{\circ} 10'$ &c., qui omnes inventi erunt numero 720, & cum prioribus efficiunt sinus numero 1080 arcuum, quorum differentia est tantum 5'. Simili modo quærantur alii quatuor sinus inter inventos, ita ut

ut horum arcus differant tantum $1'$, qui omnes erunt numero 4320, & prioribus adjuncti sunt sinus 5400, quot nempe sunt minuta prima in quadrante.

SCHOLION II.

§. 31. Connumeravimus jure merito inter sinus repertos 5400 Problematum præcedentium beneficio sinus arcuum ab $1'$ ad $45'$: nam, etsi differentie sint ipsi sinus, idem tamen est ratiocinium; ob parvitatem enim arcus Lb $45'$ duo considerari possunt triangula æquiangula & similia Lef Lba , in quibus est Lb ad Lf ut ab ad ef quæsitum finum. Ex. gr. sit arcus Lf $15'$; sinus ab inventus (§. 25.) est in Tab. IV partium 1308. 95956; ergo ut $45'$ ad 1308. 95956 ita $15'$ ad quartum terminum, qui erit partium 436. 31985.

SCHOLION III.

§. 32. Quum igitur arcus minimi ad sensum sumi possunt sinibus suis proportionales, facile inveniuntur sinus arcuum minorum secundorum hanc analogiam instituendo, ut arcus unius minuti primi sive $60''$ ad suum finum inventum (§. 30.), ita arcus tot secundorum quot volueris ad finum correspondentem. Quod si datus fuerit arcus, qui præter gradus, & minuta prima etiam secunda contineat, ex. gr. $22^{\circ} 18' 32''$, cujus finum hic usque non invenimus ita procedendum sumatur differentia inter finum inventum $22^{\circ} 18'$ & $21^{\circ} 19'$ proximè sequentem, quæ erit 2691; hinc dicatur si $60''$ dant 2691 quot dabunt 32? quartus terminus erit 1435, qui additus minori finui $22^{\circ} 18'$, qui est, ultimis tribus cyphris mul-

*multilatus, 3794562, dat sinum quæsitum 37959.
97 arcus 22° 18' 32".*

PROBLEMA VIII.

*Fig. 1 Dato in partes radii sinu ON arcus alicujus DN
invenire ejusdem arcus Tangentem pri-
mam DI, & secundam KS in
easdem radii.*

§. 33. Ex similitudine duorum triangulo-
rum AON ADI infertur analogia, ut AO
ad ON ita AD ad DI, in qua, quum tres
primi termini sint noti, nempe AO cosinus ar-
cus dati ND, ON sinus datus & AD radius,
tangens DI non ignorari necesse est. Eodem
ratiocinio fit nota secunda tangens KS, trian-
gula enim duo AON AKS sunt similia, nam
angulus S æquatur angulo SAO; anguli verò
ad K & O sunt recti: erit ergo ut ON sinus
datus ad AO cosinum arcus dati DN, ita AK
radius ad cotangentem KS: sive melius, ex
tangente DI data, sunt enim etiam triangu-
la AID AKS æquiangula, ut tangens prima
inventâ DI ad AD radium, ita idem radius
AK ad tangentem secundam KS quæsitam,
quæ ex primis tribus terminis notis etiam in-
notescet. Ex. gr. arcus ND sit 15°, erit si-
nus NO partium 25881. 90451 in Tab. I;
cosinus verò AO in eadem Tab. 96592. 582-
63; proinde est AO 96592. 58263 ad NO.
25881. 90451 ita AD 100000. 00000 ad
quartum DI, qui erit 26794. 91924. Simili-
ter pro cotangente est DI 26794. 91924 ad
AD 100000. 00000., ita AK 100000. 00000
ad quartum KS, qui erit 37320508076. Q.
e. i. et d.

SCHO-

S C H O L I O N.

§. 34. Postquam igitur constructus fuerit canon sinuum ad singula minuta prima & secunda, si placet, quadrantis, facile patet per hoc Problema construi posse canonem tangentium ad eadem quadrantis minuta.

P R O B L E M A IX.

Dato in partes radii sinu ON alicujus arcus ND invenire ejusdem arcus secantem primam AI & secundam AS in eadem radii.

Fig. 1

§. 35. Quoniam triangula duo AON ADI sunt æquiangula, erit ut AO cosinus arcus dati ND ad radium AD, ita AN idem radius ad AI secantem quæsitam, quæ innotescet ex primis tribus terminis notis. Item quum triangula duo ANO AKS sint æquiangula, erit proportio ut NO sinus arcus dati ND ad AN radium, ita idem radius AK ad AS secantem secundam, quæ ex primis tribus notis non ignorabitur. Ex. gr. sit arcus ND 15° , ejus sinus 25881. 90451, & cosinus AO 96592. 58265; per hunc igitur si dividatur quadratum radii prodit secans prima AI 803527. 61804; sed si quadratum radii dividatur per sinum NO, quotum dat secundam AS 386370. 33031. Q. e. i. et d.

S C H O L I O N I.

§. 36. Satis ex hoc problemate apparet modus construendi canonem secantium ad singula minuta

prima & secunda, si placet, quadrantis dato eo prius sinuum; sed quia canon hic siccantium in recentiori Trigonometria nullius est usus, propterea quod Problemata omnia tam plana quam sphaerica absque ejus praesidio facillimè resolvantur, eum utpote inutilem profigiendum a tabulis nostris Trigonometricis logarithmicis constituimus.

SCHOLION II.

§. 37. Jam hic Tyronibus animadvertendi locus est, quare canonem construere necesse sit radio assumpto in partes minutissimas diviso. Nulla quidem ex puncto hoc difficultas orietur Arithmeticae peritis, quales Trigonometriae candidatos supponimus, postquam diligenter consideraverint modum, quo in sinubus inveniendis per calculum usus sumus. Priores enim sinus illi 120 sese 45' superantes, excepto radio, per extractionem radicis a numeris ut plurimum non quadratis, hoc est, a quibus exactè radix extrahi nequit, eruti sunt; an igitur affirmabimus sinus illos praecisè veros esse tali extractione comparatos, licet excessus vel defectus non major existat unitate? Item alii sinus intermedii, qui ex Probl. VII per regulam proportionis eliciuntur duplici laborant vitio; primum, quod rarè contingit quartum terminum in proportionem invenire absque aliqua adjuncta fractione, quam quum missam facere oporteat, ne calculi molestissimi efficiantur ac ferè intrahabiles, patet ex hoc capite de exactitudine sinuum actum esse; Secundum, quod arcus non majores, 45' pro rectis assumantur in eo Problemate, quæ quidem suppositio quum exactè vera non sit, neque etiam sinus ex ea profluentes pro exactis habendi sunt. Ex quibus omnibus illud concludere æquum est sinus omnes erroribus aliquibus obnoxios

xios esse debere ob discretam numerorum naturam, qui errores, quum sinus ex hac comuni methodo unus ea altero deducatur, in casibus quibusdam in partem se mutuo destruuntur, in aliis verò duplicantur continuo: ex quo fit, ut si plures sinus nostra methodo ordinaria inventos cum iisdem diversa methodo, puta serierum infinitarum erutis, conferas, in quibusdam observatur parva aut nulla, in aliis verò non contemnenda differentia. Quoniam igitur vitia hac numerorum præcaveri non possunt, ea saltem tam exigui momenti reddere curandum est, ut tunc absque sensibili errore negligi possint. Voti hujus compotes erimus quo in majores numero partes radius dividatur, in hoc enim casu differentia a vero sinu semper minor evadit, quum hac in partibus minutissimis, adeoque contemnendis, consistat. Quibus rationibus innixus Rheticus, ut canonem constructum ad radium 100000. 00000 exhiberet, assumpsit radium eundem in partes 100000. 00000. divisum, & quinque posteriores figuras rescavit, in quibus vitium, si quod est, ut contemplanti patet, contineri est necessè; ea tamen conditione ut si fractio, cujus numerator exprimitur per quinque illos figuras rescatas, & denominator per unitatem cum quinque cyphris quot sunt nempe figura rescanda, sit major dimidio unitatis, tunc unitatem addidit ultimæ residui figuræ; ex quo factum est, ut proximè verum, quoad fieri potest, valorem sinuum haberemus. His primis Rhetici laboribus posseri usi sunt, & nos utimur in præsens opus, in quo Canonis construendi methodum ad radium 100000 00000 edocuiamus, quod ad Tyronum intelligentiam sufficere judicatum est, etsi tres ultimæ figuræ rescantur in tabulis ordinariis, ut canon correctus prodeat ad radium 100000. 00, adhibita Rhetici jam notata corre-

ctione, in cuius gratia sit exemplum sinus arcus 84° , qui est 99452. 18954; tres igitur ultimas figuras 954 refecando provenit fractio $\frac{954}{100000}$, quæ ferè unitatem adæquat, unde unitas addenda est residuo, ut fiat 99452. 19. sinus correctus 84° ad radium 100000. 00. Item si detur sinus 48° qui est 74314. 48255, quum tres ultima figurae 255 dent fractionem $\frac{255}{100000}$ minor dimidio unitatis, turd negligenda est, ac proinde sinus 48° ad radium 100000. 00 est 74314. 48 nulla adhibita correctione.

SCHOLION III.

§. 38. His omnibus tandem, quæ hucusque edocuimus, probè intellectis & pensatis nil reliquum difficultatis superest: videtur circa dispositionem Tabulæ sinuum & Tangentium, quod negotium aliquod Tyronibus faceffere possit: Ea enim dispositio ex ipsa sinuum natura fluit; nam, quum sinus quilibet dici possit cosinus respectu sui cosinus tanquam sinus considerati, ratio patet quare ejusdem columnæ sinuum in superiori parte inscribatur sinus, in inferiori verò Cosinus, & contra. Ex. gr. Sinus arcus 12° dicitur sinus respectu ad ejus cosinum 78° ; si verò sinus arcus 78° tanquam primus assumatur, sinus arcus 12° dicetur cosinus respectu hujus. Quoties igitur inveniendus est sinus arcus non majoris 45° observabitur titulus graduum quæstorum in parte superiori, & in columna sive sinistra minuta prima, quæ continuè deorsum versus crescunt usque ad $60'$, quibus exscriptus est sinus congruus; vicissim verò sinus arcuum majorum 45° quærendi sunt in inferiori titulo, minuta in columna dextera continuè sursum versus crescentia. Penes numeros hos, quos jam denique invenire docui-

docuimus, Naturales appellatos exprimentes \log finus & Tangentes in plerumque auctorum tabulis e regione adscribuntur numeri alii Artificiales seu logarithmici vocati, quorum Theoriam ac usum in sequenti capite faciliiori ac breviori methodo, quoad fieri potest, aperiemus; in nostris vero tabulis Naturales numeros missos facere iudicavimus, quum per Artificiales tantum in nostra methodo omnium triangulorum resolutio abundè perficiatur, atque illorum vice, quod longe quoad calculum utilius est, differentias logarithmorum adscripsimus, quarum beneficio haberi possunt finus, qui præter gradus & minuta primæ etiam secunda contineat, quod magis ex inferius dicendis elucescet.

C A P U T II.

De natura, & Proprietate Logarithmorum:

D E F I N I T I O I.

§. 39. **S**I dentur quæcunque quantitates homogeneæ, quarum differentia, primæ nempe a secunda, secundæ a tertia, hujus a quarta, atque ita in infinitum, sit semper eadem, quum sint æqui differentes, dicuntur esse in *Serie Arithmetica*, sive *Arithmeticæ continuæ proportionales*. Ita numeri 1, 2, 3, 4, 5, 6, 7, 8, &c. dicuntur esse in *Serie Arithmetica*, nam differentia cujuslibet a priori est semper 1. Pari ratione sequentes Series sunt *Arithmeticæ*, primæ enim differentia est semper 3, secundæ $\frac{1}{2}$, tertiæ demum 5.

1, 4, 7, 10, 13, 16, 19, 22, &c.

$\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, &c.

35, 30, 25, 20, 15, 10, 5, &c.

CO:

COROLLARIUM I.

§. 40. Ergò Series Arithmeticæ in infinitum variari possunt, hoc est, tot dari Series diversæ, quot sunt numeri, eorumque partes, qui singillatim possunt assumi pro differentiis numerorum in serie constitutorum. Hæ autem series vel continuò crescere possunt, ut in prioribus apposis, vel decrescere, ut in ultimis; proinde in primo casu dicuntur *Series crescentes*, in secundo *decrecentes*.

COROLLARIUM II.

§. 41. Quibus probè intellectis patet, secundum terminum in serie Arithmetica æqualem esse primo plus differentia in crescenti, vel minus in decrecenti; tertium plus dupla differentia in crescenti, vel minus in decrecenti; quartum plus, vel minus tripla differentia; & sic in infinitum: ac proinde si sint tres termini continui in serie crescenti summa primi ac tertii æquatur duplo medii; nam tertius componitur ex primo plus dupla differentia, ergo summa primi & tertii constabit ex duplo primo, & dupla differentia, idest ex duplo medii. Simili modo demonstratur si termini sint decrecentes. Unde si duo termini dati sint, primus nempe ex. gr. 6 & tertius 12 faciliè secundus invenitur; tertius enim componitur ex primo & dupla differentia, quæ in nostro exemplo est 6; hujus dimidium 3 si primo termino 6 addatur provenit 9 pro secundo quæsito. Quod si duo primi tantum termini dati sint eodem ratiocinio tertius invenitur.

CO.

COROLLARIUM III.

§. 42. Si dentur quatuor numeri, ita ut differentia inter primum & secundum eadem sit ac ea inter tertium & quartum, ex. gr. 3, 5, 6, 8 differentia inter 3 & 5 æquatur differentiæ inter 6 & 8, licet inter secundum terminum & tertium diversa detur differentia, tamen hi quatuor numeri dicuntur esse *Aritbmetice discretim Proportionales*, in quo casu adnotandum est summam primi termini & quarti æqualem esse summæ secundi & tertii; quum enim secundus terminus componatur ex primo plus differentia, & quartus ex tertio plus eadem differentia, patet summam primi termini & quarti componi ex primo termino, differentia, & tertio; summam verò secundi termini & tertii ex primo termino, differentia, ac tertio; proinde quum partes componentes sint utrobique eadem, aggregatum æquale esse necesse est. Eodem modo idem demonstratur si termini sint decrescientes. Clarè liquet igitur, quod si sint dati tres termini discretim æquidifferentes, & quartum assignare debeamus; nil aliud agendum quam tertio adjicere differentiam, si crescunt, vel demere si decrescunt, quæ est inter primum terminum ac secundum; proinde quartus terminus componitur ex summa termini secundi & tertii dempto primo.

S C H O L I O N.

§. 43. Illud hic superest advertendum, quod etiam si o sit quantitatis omnis privatio, nec aliud quam nihil per se denotet, in quibusdam tamen progressionibus Aritbmeticis termini realis locum occu-

44
occupare potest. Ex. gr. sit series Arithmetica
0 1 2 3 4 5 6 7 &c. jam patet ex definit. 0 esse
terminum in serie, eadem enim est differentia in-
ter 1 & 0, ac inter 1 & 0: similiter in serie
0, $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3 &c. 0 est terminus in
serie, quum differentia inter $\frac{1}{2}$ & 1 eadem sit ac
ea inter $\frac{1}{2}$ & 0. Sed non ita in serie 1 4 7 10-
13 16 &c. differentia enim inter 1 & 4 est 3,
verum inter 1 & 0 est 1. Quod adnotasse sufficiat,
sua enim utilitate ut deinceps videbimus, non
caret.

DEFINITIO II.

El. lib. V.
def. 8

§. 44. Si dentur quæcunque quantitates ho-
mogenæ, quarum ratio primæ nempe ad se-
cundam, secundæ ad tertiam, hujus ad quar-
tam, atque ita in infinitum sit semper eadem,
quum sint Geometricæ proportionales*, dicun-
tur esse in Serie Geometrica, sive Geometrica
continuo Proportionale: Ita numeri 1 2 4 8 16
32 &c. sunt in Serie Geometrica, eadem enim
est ratio 1 ad 2, ac 2 ad 4; & 2 ad 4 eadem
ac 4 ad 8, &c. Pari ratione sequentes Series
sunt Geometricæ, exponens enim rationis pri-
mæ est $\frac{1}{10}$, secundæ 2, tertiæ denum $\frac{1}{2}$ sive $\frac{1}{2}$.

1 10 100 1000 10000 100000 &c.

1 $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{16}$ $\frac{1}{32}$ &c.

3 6 12 24 48 96 &c.

COROLLARIUM.

§. 45. Quibus sit appidò manifestum Series
Geometricæ in infinitum variari posse, hoc
est, tot dari series diversæ, quot sunt nume-
ri, eorumque partes, qui singillatim possunt
assumi pro exponentibus rationis serierum. Hæ

au-

autem series vel continuò crescere possunt, ut in prioribus appositis, vel decrescere, ut in ultima; unde in primo casu dicuntur *crescentes*, in secundo *decrescentes*.

SCHOLION.

§. 46. Quum igitur in serie Geometrica ratio termini unius ad alterum sit effectiva & realis, deducitur nunquam has series habere posse o pro termino; nisi in eo tantum casu, in quo series aliqua proposita sit decrescens; in hac enim si termini continentur in infinitum, tandem ad terminum aliquem infinitè parvum deveniemus, qui tunc absque sensibili errore pro o assumi potest.

DEFINITIO III.

§. 47. Si ita comparentur duæ Series una Geometrica, altera Arithmetica, ita ut hujus termini singuli singulis in Geometrica progressionem respondeant; termini in progressionem Arithmetica tali comparationis respectu peculiariter Logarithmi appellantur. Ita in tabella inferiori in serie Arithmetica A 1 est logarithmus correspondens unitati in Serie Geometrica; 2 est logarithmus numeri binarii in Serie Geometrica; 3 est logarithmus numeri 4; 4 est logarithmus numeri 8, & sic in infinitum. Idem dic de Serie B, aut quacunque alia; nempe 3 est logarithmus numeri 2; 7 numeri 8; 11 numeri 32, & sic de singulis.

CO.

Series Geometrica.	Series Arithmetica.		
	A	B	C
1	1	1	1
2	2	3	$2\frac{1}{2}$
4	3	5	4
8	4	7	$5\frac{1}{2}$
16	5	9	7
32	6	11	$8\frac{1}{2}$
64	7	13	10
128	8	15	$11\frac{1}{2}$
&c.	&c.	&c.	&c.

Series Arithmetica	Series Geometricæ.		
1	1	3	1
2	2	9	10
3	4	27	100
4	8	81	1000
5	16	243	10000
6	32	729	100000
7	64	2187	1000000
8	128	6561	10000000
&c.	&c.	&c.	&c.

COROLLARIUM I.

§. 48. Quum igitur Series Arithmeticæ infinitè diversæ assignari possint (§. 38) patet, unam, eandemque progressionem Geometricam infinitos numeros diversos habere posse pro Logarithmis, prouti scilicet cum diversis infinitè seriebus Arithmeticis comparetur. Pari ra-

tione e contra idem logarithmus, ut in secunda Tabella videre est, assignari potest diversis infinitè numeris in progressionem Geometrica; hæ enim progressionès infinitè numero diversæ esse possunt (§. 41).

COROLLARIUM II.

§. 49. Utcunque igitur sumantur termini in Serie Geometrica, ex. gr. 1, 4, 16, 64 proportionales, etiam & numeri, 3, 5, 7 qui illorum log-mos exprimunt, sunt Arithmeticæ proportionales; quum enim distantia primi termini Geometrici a secundo sit eadem ac tertii a quarto, erit etiam differentia primi termini logarithmici a secundo eadem ac secundi a tertio: & sicuti nova oritur Series Geometrica diverso prædita exponente, ita quoque nova oritur Series Arithmetica novâ incedens differentia.

DEFINITIO IV.

§. 50. Canon Logarithmicus dicitur Series numerum.

merorum naturalium ab unitate incipientium 1, 2, 3, 4, 5, 6, 7, &c. extensa usque ad numerum aliquem magnum, puta in vulgari canone ad 10000, semper creicens unitatis differentia, quorum singulis exscripi sunt proprii competentes logarithmi: ita ut cujuscunque numeri vel infra 10000 inveniatur notatus log-mus, vel supra 10000 inveniri possit per scriptos log-mos. Hæc nunc adnotasse sufficiat; methodus enim canonem construendi, constructoque utendi infra docebitur.

SCHOLIION.

§. 31 Licet igitur infinite diversas series Arithmeticas Geometricæ datæ assignare possimus pro log-mis, &c. contra; tamen, quum comparationem hanc seriei Geometricæ ac Arithmeticæ ea tantum conditione consideremus, ut a maximorum numerorum multiplicatione, divisione, elevatione ad potentias, vel radicum extractione canonis beneficio liberemur substituta tantum additione, vel subtractione, seligenda est utraque series quam simplicior haberi potest, quæ ad rem faciat, &c. ad canonem componendum sit magis idonea. Quo habito respectu Mathematici Seriem Geometricam posuerunt decupla incedentem ratione 1 10 100 1000 10000 &c. Arithmeticam vero selexerunt eam, quæ unitatis tantum differentia procedit, 1 2 3-4 5 6 7 &c.

PROPOSITIO I.

Posita Serie Geometrica incipiente ab unitate &c. Arithmetica a termino 0, ita ut log-mus unitatis sit 0, erit summa log rum correspondentium duobus quibuscunque terminis se multiplicanti-
bur

bus in Serie Geometrica æqualis log-mo producti terminorum multiplicatorum.

§. 52. Per ea quæ demonstrata sunt ab Euclide in omni multiplicatione duorum terminorum semper est unitas ad factorem unum ut factor alter ad factum; per consequens log-mus unitatis, log-mi factorum, ac is facti erunt quatuor termini æquidifferentes (§. 47., 49.) ergo summa ex log-mis factorum æquatur summæ ex log-mis unitatis & facti; sed log-mus unitatis positus est 0; proinde summa ex log-mis factorum æquatur log-mo facti. Q. e. D.

A	B
1	0
2	1
4	2
8	3
16	4
32	5
64	6
128	7
&c.	&c.

EXEMPLUM.

Sit Series Geometrica A, cujus log-mi B, sumptis duobus quibuscunque numeris 4, 8 horum factum est 32, cujus log-mus correspondens est 5, summa nempe log-rum 2 & 3 correspondentium factoribus 4 & 8.

COROLLARIUM.

§. 53. Quum quadratum efficiatur ex radice in se ipsam ducta, patet log-mum quadrati duplum esse log-mi radice. Ita quadratum ex 2 est 4, cujus log-mus 2 est duplus log-mi correspondentis radici 2. Quadratum ex 4 est 16, cujus log-mus 4 similiter est duplus log-mi radice 4, atque ita semper: eodem ratio-cinio log-mus cubi est triplus, biquadrati quadruplus, potentiæ quintæ quintuplus, &c. log-mi radice.

PRO-

P R O P O S I T I O II.

Posita Serie Geometrica incipiente ab unitate & Arithmetica a termino 0, ita ut log-mus unitatis sit 0, erit log-mus quoti æqualis differentiæ log-rum divisoris & dividendi.

§. 54. Per ea quæ demonstrata sunt ab Euclide in omni divisione duorum terminorum semper est divisor ad dividendum, ita unitas ad quotum, ergo log-mi divisoris, dividendi, unitatis, & quoti sunt quatuor termini æqui differentes (§. 47 49); proinde log-mus quoti componitur ex differentiæ log-mi divisoris, ac log-rum dividendi & unitatis simul sumptorum (§. 42); sed log-mus unitatis positus est 0; ergo log mus quoti æquatur differentiæ log-rum divisoris & dividendi Q. e. D.

E X E M P L U M.

Sit Series Geometrica A, cujus log-mi B, in ea sumatur numerus aliquis puta 64 dividendus per 4; patet log-mum 4 correspondentem quoto 16 esse differentiæ inter 6 & 2, log-mos nempe dividendi & divisoris.

C O R O L L A R I U M.

§. 55. Si ergo alicujus log-mi sumatur dimidium, hoc erit log-mus radicis quadratæ numeri correspondentis log-mo integro. Ex. gr. dimidium log-mi 6 correspondentis numero 64 est log-mus numeri 8 radicis quadratæ numeri 64: si sumatur tertia pars nempe $\frac{1}{3}$ ejusdem

D
log-

log-mi 6 ; hæc exhibet log-mum numeri 4 radicis scilicet cubicæ numeri 64 correspondentis log-mo 6. Nam (§. 53.) quum quadratum efficiatur ex radice in se ipsam ducta, & cubus ex radice bis in se ipsam ducta, per consequens log-mus quadrati sit duplus log-mi radicis, & log-mus cubi triplus ejusdem log-mi radicis, patet e converso dimidium log-mi quadrati esse log-mum radicis quadratæ, & tertiam partem log-mi cubi esse log-mum radicis cubicæ : Eademque ratione quarta pars log-mi alicujus correspondet radici biquadraticæ termini illius; quinta pars radici potentix quintæ, & sic in inf.

SCHOLION.

§. 56. Jam hic Tyrones advertere possunt quare Geometra ex infinitis seriebus arithmeticis, quæ applicari possunt seriei Geometricæ datæ pro log-mis (§. 48.) hanc selegerint quæ a termino 0 incipit & unitatis differentia procedit. Nam si seriei Geometricæ ab unitate incipienti huic adscriptus fuisset numerus aliquis pro log-mo, puta 1, a summa log-rum duorum quorumlibet in multiplicatione detrahendus esset log-mus unitatis, ut efficiatur log-mus producti, & in divisione addendus esset log-mus unitatis log-mo dividendi, ut efficiatur log-mus quoti ex demonstratis in præcedentibus Propositionibus : Positi ergo unitatis log-mo 0 expeditiores calculi fiunt, quum sola log-rum additione multiplicatio, & sola eorundem subtractione divisio numerorum instituantur. Quod magis inferius patebit.

PRO-

PROPOSITIO III.

*Log-rum tabulas construere; hoc est singulis
numeris inter 1 & 10000 log-mos
peculiares assignare.*

§. 57. Assumatur series Geometrica 1 10
100 1000 10000 &c. cui log-mi adscripti sint
0 1 2 3 4 &c. jam ut problemati satisfiat in-
quirendi sunt log-mi numerorum intermediorum
seriei Geometricæ, nempe numerorum 2, 3,
4, 5, 6, 7, 8, 9, qui sunt inter 1 & 10;
item numerorum 11, 12, 13, 14 &c. qui
sunt inter 10 & 100; & sic de singulis inter
100 & 1000, & inter 1000 & 10000. Li-
quet ex demonstratis, quod si inter 1 & 10
invenitur medius Geometricus, & inter horum
log-mos 0 & 1 medius arithmeticus, hic erit
log-mus medii Geometrici: quum autem inter
1 & 10 non detur exactè verus medius geo-
metricus, inter 0 vero & 1 per fractionem
medium arithmeticum exprimere necesse sit,
hinc factum est ut Geometricæ tam seriei geo-
metricæ, quam arithmeticæ plures 0 adjun-
xerunt, atque ita fractionum decimalium be-
neficio licet præcise veros log-mos habere non
possimus, nihilominus quoad usum spectat ac-
curatis æquipollent. Sufficit assumere in Ta-
bulis ordinariis pro log-mo denarii numerum
100000. 00, quantus nempe statutus est sinus
totus sive radius; quum enim log-mis utamur
præcipue habita ratione ad numeros, qui Sinus
& Tangentes denotant, tantus debet esse log-mus
denarii quantus ipse radius; at pro Tabulis
constituendis, ut exactiores evadant, adhuc
adjiaciendæ sunt tres cyphræ, ita ut denarii

D 2 log.

log-mus sit 100000.00000, quorum ratio inferius manifestabitur. Hisce positis sit modo inquirendus log-mus numeri alicujus ex intermediis seriei geometricæ inter 1 & 10, puta numeri 7, sive, quod idem est, fractionis $\frac{700000.00000}{100000.00000}$, quum log-mus denarii sit 1.00000.00000, addantur ipso denario novem cyphræ ita ut tot habeat quot suus log-mus, per consequens unitati seu primo termino seriei geometricæ addi etiam debent novem cyphræ, ut servantur in serie 1.00000.0000, 10.0000.00000 &c. Ita auctis seriebus Geometrica, & Arithmetica inveniatur medius proportionalis inter 1.00000.0000 & 10.0000.00000, qui erit 3.16227.7660, cujus log-mus erit 0.50000.00000 dimidium nempe summæ log-rum unitatis 0.00000.00000, & denarii 100000.00000 : inquiretur ulterius alius medius geometricus inter inventum 3.16227.7660 & denarium 10.0000.00000, qui magis ad septenarium quæsitum accedat, is erit 5.62341.3251, cujus log-mus est 0.7500.00000 dimidium scilicet summæ log-rum denarii, & numeri 3.16227.7660 : item inveniatur medius geometricus inter inventum 5.62341.3251 & denarium, hic erit 7.49894.2093, qui etsi ad numerum septenarium accedat, eum tamen superat parte sua $\frac{49894.2093}{100000.00000}$; atque huius medii geometrici log-mus invenitur 0.85500.00000. Quum ergo medius hic inventus excessu peccat a numero septenario, ut maximè ad eum accedat, alius medius inveniendus non inter denarium & inventum, sed inter inventum & alium inventum proximè inferiorem 5.62341.3251 ; hic erit 6.49381.6316, cujus log-

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log-mus 0.81250.00000? atque ita semper in-
veniendo medium proportionalem atque huius
log-mum tandem post tres & triginta medios
inventos, ut in tabella sequente videre est,
devenitur ad 7.00000.00000, sive ad nume-
rum 7, cujus log-mus quæsitus est 0.84509.
80400.

T A B. I.

1.00000.00000	0.00000.00000	6.97830.5849	0.84375.00000
3.16227.7660	0.50000.00000	7.00975.9615	0.84570.31250
10.00000.00000	1.00000.00000	7.04135.5155	0.84765.62500
3.16227.7660	0.50000.00000	6.97830.5849	0.84375.00000
5.62341.3251	0.75000.00000	6.99401.5050	0.84472.65625
10.00000.00000	1.00000.00000	7.00975.9615	0.84570.31250
5.62341.3251	0.75000.00000	6.99401.5050	0.84472.65625
7.49894.2093	0.87500.00000	7.00188.2906	0.84521.48437
10.00000.00000	1.00000.00000	7.00975.9615	0.84570.31250
5.62341.3251	0.75000.00000	6.99401.5050	0.84472.65625
6.49381.6316	0.81250.00000	6.99793.5836	0.84497.07031
7.49894.2093	0.87500.00000	7.00188.2906	0.84521.48437
6.49381.6316	0.81250.00000	6.99793.5836	0.84497.07031
6.97830.5849	0.84375.00000	6.99991.5115	0.84509.27734
7.49894.2093	0.87500.00000	7.00089.8941	0.84515.38080
7.23394.1627	0.85937.50000	7.00188.2906	0.84521.48437
6.97830.5849	0.84375.00000	6.99991.5115	0.84509.27734
7.10497.4114	0.85156.25000	7.00040.7010	0.84512.32910
7.23394.1627	0.85937.50000	7.00089.8941	0.84515.38080
6.97830.5849	0.84375.00000	6.99991.5115	0.84509.27734
7.04125.5155	0.84765.62500	7.00016.1056	0.84510.80322
7.10497.4114	0.85156.25000	7.00040.7010	0.84512.32910

D 3

6.999.

6. 99991. 5115	0. 84509. 27734	6. 99999. 9655	0. 84509. 80186
7. 00003. 8084	0. 84510. 04028	6. 99999. 9897	0. 84509. 80336
7. 00016. 1056	0. 84510. 80322	7. 00000. 0137	0. 84509. 80485
6. 99991. 5115	0. 84509. 27734	6. 99999. 9897	0. 84509. 80336
6. 99997. 6598	0. 84509. 65881	7. 00000. 0016	0. 84509. 80410
7. 00003. 8084	0. 84510. 04028	7. 00000. 0137	0. 84509. 80485
6. 99997. 6598	0. 84509. 65881	6. 99999. 9897	0. 84509. 80336
7. 00000. 7340	0. 84509. 84955	6. 99999. 9956	0. 84509. 80373
7. 00003. 8084	0. 84510. 04028	7. 00000. 0016	0. 84509. 80410
6. 99997. 6598	0. 84509. 65881	6. 99999. 9956	0. 84509. 80373
6. 99999. 1970	0. 84509. 75418	6. 99999. 9987	0. 84509. 80392
7. 00000. 7340	0. 84509. 84955	7. 00000. 0016	0. 84509. 80410
6. 99999. 1970	0. 84509. 75418	6. 99999. 9987	0. 84509. 80392
6. 99999. 9655	0. 84509. 80186	7. 00000. 0002	0. 84509. 80401
7. 00000. 7340	0. 84509. 84955	7. 00000. 0016	0. 84509. 80410
6. 99999. 9655	0. 84509. 80186	6. 99999. 9987	0. 84509. 80392
7. 00000. 3499	0. 84509. 82571	6. 99999. 9994	0. 84509. 80396
7. 00000. 7340	0. 84509. 84955	7. 00000. 0002	0. 84509. 80401
6. 99999. 9655	0. 84509. 80186	6. 99999. 9994	0. 84509. 80396
7. 00000. 1576	0. 84509. 81378	6. 99999. 9998	0. 84509. 80399
7. 00000. 3499	0. 84509. 82571	7. 00000. 0002	0. 84509. 80401
6. 99999. 9655	0. 84509. 80186	6. 99999. 9998	0. 84509. 80399
7. 00000. 0617	0. 84509. 80783	7. 00000. 0000	0. 84509. 80400
7. 00000. 1576	0. 84509. 81378	7. 00000. 0002	0. 84509. 80401
6. 99999. 9655	0. 84509. 80186		
7. 00000. 0137	0. 84509. 80485		
7. 00000. 0617	0. 84509. 80783		

Similem improbum laborem subierunt logarithmi conditores, ut log mos assequerentur numerorum 2, 3, 5, 11, 13, &c. qui *simplices*, seu *primi* appellantur eo quod aliquotas non habeant, & sola metiantur unitate; reliquis verò, qui *compositi* dicuntur, facili negotio log-mi assignantur. Ex. gr. log-mus numeri 4 habetur sumendo duplum log-mi numeri 2, quum 4 sit quadratum numeri 2; atque ita triplum log-mi numeri 2 est log-mus numeri 8, quoniam hic est cubus numeri 2 (§. 53). Sic etiam addendo log-mum numeri 2 log-mo numeri 3 fit log-mus numeri 6 (§. 52), nam 6 producitur ex 2 in 3; atque ita procedendo ex log-mis numerorum *primorum* datis invenies log-mos omnes *compositorum*. Ita si queramus log-mos numerorum 20, 30, 40, &c. considerabimus eos tanquam productos ex 2 in 10, ex 3 in 10, ex 4 in 10 &c. ac proinde si in unam summam colligamus log mos numerorum 2 & 10, numerorum 3 & 10, item 4 & 10, &c. provenient log-mi numerorum 20, 30, 40, &c. Factum est igitur, quod patebatur.

COROLLARIUM I.

§. 58. Quum autem positum fuerit log-mum unitatis esse 0, denarii 1, centenarii 2 &c. evidens est numeros omnes inter unitatem & denarium habere log mos, quorum prima figura est semper cyphra 0. minores nempe unitate; numeros verò inter denarium & centenarium habere log-mos incipientes ab 1; similiter log-mi numerorum inter centenarium & millenarium incipiunt ab 2; atque ita semper: quamobrem Trigonometrici hanc primam figuram appellant *Caracteristicam*, & puncto, ut factum vides,

D 4

a re-

a reliquis distinxerunt: undè si datus sit log-mus aliquis statim cognoscetur quot figuris constet numerus, cui correspondet; si enim caracteristica est 0, numerus unicà constat figurà; si est 1, numerus constat ex duabus figuris; si 3, numerus quatuor habet figuras; atque ita semper numerus constabit ex tot figuris, unà plus, quot caracteristica.

COROLLARIUM II.

§. 59. Ex dictis patet numeros omnes supra denarium eosdem habere log-mos ac si per 10 multiplicentur mutatà tantum caracteristicà. Ex. gr. si numerus 13, cujus log-mus est 1. 11394. 33523, multiplicetur per 10 proveniet 130, cujus log mum habebis si priori invento addas log-mum denarii 1. 00000. 00000, summa horum log-rum est 2. 11394. 33523, qui tantum caracteristicà differt a numero 13. Ita si numerus 130 denuò per 10 multiplicetur, habetur 1300 cujus log-mus est 3. 11394. 33523, &c. Hoc est fundamentum dispositionis Tabulæ logarithmicæ.

SCHOLION.

§. 60. Innuimus in Problematis resolutione, quod etsi in Tabulis proffet log-mus denarii ad numerum 100000. 00, tamen in earum constructione, ut exactiores evadant, assumi debere 1000000. 00000, juxta quem numerum inventi log-mi mutilari debent tribus ultimis figuris; ita ut si hæ tres ultimæ figuræ conficiant fractionem majorem dimidio unitatis, hoc est $\frac{5}{10}$ tunc unitas addenda est residuo, ut log mus correctus evadat. Ex. gr. log-mus numeri 16 est 1. 20411. 99827, si abscindan-
tur

37

tur ab hac log-mo tres ultima figura 817, hæ
 conficiunt fractionem $\frac{1}{2} \frac{11}{100}$ maiorem $\frac{1}{1000}$, ac
 proinde log-mo 1. 20411.99 tribus figuris mutila-
 to addenda est unitas, ut fiat correctior 1. 0412.
 00. Hanc correctionem non haberemus si log mus
 denarii supputatus fuisset ad numerum 100000.
 00; quod altero exemplo illustrare libet. Quara-
 tur log mus numeri 7 ad denarii log num 100000.
 00: manifestum est ex Tabella inferius opposita
 post unum & viginti medios proportionales inven-
 tos provenire log-mum numeri 7 talem 0. 84509.
 80, minori sanè calculi labore, quam ut superius
 factum sit, at minus exactè: nam si ex superius
 dictis numeri 2401 log-mus quærendus sit, quum
 hic numerus sit quarta potentia ipsius 7, si log-
 mum numeri 7 quater assumamus, habebimus 3.
 38039.20 pro log-mo quæsito numeri 2401 (5.53);
 at log-mus numeri 7 quæsitus ad denarii log num
 100000.00000 est 0. 84509. 80400, qui quater
 assumptus dat 3. 38039. 21600, abijciendo ergo
 tres ultimas figuras 600, quæ afficiunt fractionem
 maiorem $\frac{1}{1000}$ ac proinde addendo unitatem resi-
 duo, fit log-mus 3. 38039. 22, qui bixario supe-
 rat log-mum prius inventum numeri quæsiti, adeo-
 que longe correctior est priori.

T A B. II.

1. 000000	0. 00000. 00	5. 623413	0. 75000. 00
3. 162278	0. 50000. 00	7. 498942	0. 87500. 00
10. 000000	1. 00000. 00	10. 000000	1. 00000. 00
3. 162278	0. 50000. 00	5. 623413	0. 75000. 00
5. 623413	0. 75000. 00	6. 493816	0. 81250. 00
10. 000000	1. 00000. 00	7. 498942	0. 87500. 00

6. 492816	0. 81250. 00	6. 999915	0. 84509. 28
6. 978306	0. 84375. 00	7. 000899	0. 84515. 38
7. 498942	0. 87500. 00	7. 001883	0. 84521. 48
6. 978306	0. 84375. 00	6. 999915	0. 84509. 28
7. 233942	0. 85937. 50	7. 000407	0. 84512. 33
7. 498942	0. 87500. 00	7. 000899	0. 84515. 38
6. 978306	0. 84375. 00	6. 999915	0. 84509. 28
7. 104974	0. 85156. 25	7. 000161	0. 84510. 80
7. 233942	0. 85937. 50	7. 000407	0. 84512. 33
6. 978306	0. 84375. 00	6. 999915	0. 84509. 28
7. 041355	0. 84765. 62	7. 000038	0. 84510. 04
7. 104974	0. 85156. 25	7. 000161	0. 84510. 80
6. 978306	0. 84375. 00	6. 999915	0. 84509. 28
7. 00976	0. 84570. 31	6. 999977	0. 84509. 66
7. 041355	0. 84765. 62	7. 000038	0. 84510. 04
6. 978306	0. 84375. 00	6. 999977	0. 84509. 66
6. 994015	0. 84472. 66	7. 000007	0. 84509. 85
7. 009760	0. 84570. 31	7. 000038	0. 84510. 04
6. 994015	0. 84472. 66	7. 999977	0. 84509. 66
7. 001883	0. 84521. 48	6. 999992	0. 84509. 75
7. 009760	0. 84570. 31	7. 000007	0. 84509. 85
6. 994015	0. 84472. 66	6. 999992	0. 84509. 75
6. 997836	0. 84497. 07	7. 000000	0. 84509. 85
7. 001883	0. 84521. 48	7. 000007	0. 84509. 85
6. 697936	0. 84497. 07		
6. 990915	0. 84509. 28		
7. 001883	0. 84521. 48		

PRO-

PROPOSITIO IV.

*Dato numero integro non excedente 10000
invenire ejus log-mum dispositum
in Tabula.*

§. 61. Expositâ methodo, qua singulis numeris ab 1 ad 10000 peculiâres log-mi assignantur, ac confectâ Tabulâ, ut in calce libri videre est, jam nunc explicanda est ejusdem tabulæ dispositio, ut numeri cujuscunque integri infra 10000 log-mum inveniamus. Sanè ad hoc nullâ opus foret explicatione, si methodo *P. Decha-les*, plerumque aliorum utendum esset, quippe qui in duabus columnis, in quarum sinistra sunt numeri in dextra directè horum log-mi, continuâ serie numeros omnes ab 1 ad 10000 sese unitatis differentiâ excipientes extensè scripserunt, prouti etiam in nostra tabula ab 1 ad 100 factum est: attamen quum dispositio commodior, & brevior aliter fieri possit, hanc quam secuti sumus Tyronum gratiâ explicabimus.

Numeri omnes ab 1 ad 100 extensè scripti sunt cum eorum log-mis & caracteristica; a 100 vero ad 999 adscripti sunt log-mi sed sine caracteristica, hi enim sunt communes aliis numeris a 999 ad 9999 (§. 57, 59) qui singillatim notati sunt in columnis numero decem, quorum indices exprimunt ultimam figuram numerorum a 999 ad 9999. Exemplo res magis elucescet. Sit inveniendus log-mus numeri 827; proximè a dextris hujus numeri in tabula invenio 9175055, cui anteponendo caracteristicam dato numero convenientem, quæ est 2 (§. 58) habeo 2.9175055 pro log-mo quæsito. Sed si quærendus sit log-mus numeri 8270, quum
ul.

ultima figura hujus numeris sit 0, index nempe primæ columnæ a dextra numeri dati invenio eundem numerum supra inventum 9175055, sed huic præponi debet caracteristica conveniens millenario, nempe 3, (§.58) unde numeri 8170 log mus 3.9175055 diversus a log-mo supra invento caracteristicâ tantum, ut esse debet ex notatis (§.58). Sit denique inveniendus log-mus numeri 8177; ultima figura est 7, in columna igitur octava cujus index est 7, e regione numeri 817 adscriptus invenitur log-mus, cui anteponendo caracteristicam 3 convenientem millenario, habetur 3.9178730 pro quæsito, & sic de singulis. Q. e. l.

PROPOSITIO V.

Fractionis cujuscunque log-mum assignare.

§.62. Fractio omnis vera constat ex numeratore & denominatore qui semper major est numeratore, ergo eadem semper esse debet minor unitate, eoque minor quo major est denominator. Quum autem posita sit cyphra 0 pro unitatis log-mo, illud etiam manifestum est log-mum fractionis cujuscunque minorem nihilo esse debere, hoc est, more Algebrico negativum. Ex-gr. propositus sit inveniendus log mus fractionis $\frac{1}{4}$: quoniam demonstratum est ab Arith-

Proportionales

L.Den. 4	0.6020600	natorem cujuscunque fractionis esse ad suum numeratorem ut unitas ad eandem fractionem, erit in nostro casu summa log-rum denominatoris 4 & fractionis $\frac{1}{4}$ æqualis summæ log-rum
L.Num. 3	0.4771212	
L.Unit. 1	0.0000000	
L.Frac. $\frac{1}{4}$	— 0.1249388	

nu.

numeratoris 3 & unitatis, hoc est, quia unitatis log-mus est 0, æqualis log-mo numeratoris 3: quum verò 3 dividatur per 4 patet, quod si a log-mo numeratoris dematur log-mus denominatoris remanet log-mus fractionis $\frac{3}{4}$ (§. 54); sed hoc fieri non potest, nam log-mus denominatoris semper major est log-mo numeratoris, ergo hic ab illo subtrahatur ex Algebrae præceptis, residuoque præponatur signum —, quod æque sonat ac *minus*, & demonstrat log-mum illum esse negativum, idest *minorem* unitate, ita ut si log-mus hic negativus addendus esset log mo alio, tunc ab hoc subtrahere illum oportet; contra verò addere, si detrahendus esset, ut summam vel differentiam habeamus: quorum ratio ex Algebra pendet; nobis tantum innuere, & exemplis illustrare sufficiat, ne aliquid necessarium doctrinæ logarithmicæ præterire videamur. Sit igitur fractio $\frac{1}{2}$ per numerum aliquem integrum puta 32 multiplicanda, liquet producti hujus log-mum esse summam log-rum fractionis & numeri 32 (§. 52) sed log-mus fractionis est negativus — 0. 1249388, ergo hic a log-mo 1. 5051500 numeri 32 invento in tabula detrahi debet, ut habeatur log-mus 1. 3802112 producti ex $\frac{1}{2}$ in 32: hunc eundem log-mum adscriptum videmus in tabula numero 24 correspondentem, quum revera productum ex $\frac{1}{2}$ in 32 efficiat 24. Sit ulterius dividendus numerus 86 per $\frac{1}{2}$; ut log-mum quoti hujus investigemus a log-mo numeri 86 in tabula extanti detrahendus est log-mus fractionis $\frac{1}{2}$ (§. 54) sed log-mus hujus fractionis est negativus — 0. 1760912, ergo log-mo 1. 9344984 numeri 86 addendus est log-mus hujus fractionis, ut habeamus log-mum quæ-

Proportionales

L. Den. 3	0. 4771212
L. Num. 2	0. 3010300
L. Unit. 1	0. 0000000
L. Frac. $\frac{1}{2}$ —	0. 1760912

quæsitum 2. 1105896 quoti; qui log-mus, ut videre est in tabula, correspondet numero 129, hic enim est quotus proveniens a divisione 86 per 7. Q. e. f.

COROLLARIUM.

Proportionales

§. 63. Fractio igitur omnis, cujus numerator est unitas log-mum eundem habet ac denominator, ut in exemplo patet, eâ tantum differentia, quod log-mus denominatoris est positivus, fractionis vero negativus.

L. Den. 15	1. 1760912	
L. Num. 1	0. 0000000	
L. Unit. 1	0. 0000000	
L. Frac. $\frac{1}{15}$	- 1. 1760912	

PROPOSITIO VI.

Numeri infra 10000, cui adhaereat fractio, log-mum assignare.

§. 64. Sit numerus aliquis datus 324 cum adjuncta fractione $\frac{3}{5} \frac{1}{2}$. Sumatur differentia 13384 quæ est inter log-mum 2. 5105450 numeri dati 324, & log-mum 2. 5118834 numeri insequentis 325; hinc fiat, ut denominator fractionis datæ 562 ad numeratorem 223, ita inventa differentia 13384 ad quartum invenientem; hoc erit 5328, quod additum log-mo 2. 5105450 producit log-mum quæsitum 2. 5110778 numeri 324 $\frac{3}{5} \frac{1}{2}$ nisi accuratum, quam proximè tamen accedentem ad accuratum. Q. e. f.

PROPOSITIO VII.

Dati numeri excedentis 10000 log-mum assignare.

§. 65. Dividatur is numerus per 10, vel 100,
vel

vel 1000, vel 10000 &c. ea habita ratione ut quotus sit minor 10000, ac per consequens ejus log-mus haberi possit ex Tabula. Ex. gr. sit inveniendus log-mus numeri 3426573, hic divisus per 1000 dat quotum 3426 $\frac{573}{1000}$: log-mus numeri 3426 in Tabula est 3. 5347674, cui addendo 4339 pro fractione adjuncta $\frac{573}{1000}$ (§. præ) habemus log-mum 3. 7552213 numeri 3426 $\frac{573}{1000}$; quum autem numerus hic multiplicatus per 1000 det 3426573, cujus log-mum inquirere debemus, patet log-mo supra invento addi debere log-mum numeri 1000, seu quod generaliter dictum sit, caracteristicæ log-mi inventi addi debent tot unitates, quot cyphas continet divisor (§. 38) in nostro casu 3, ac proinde numeri propositi log-mus quæsitus est 6. 7552213.

Eodem modo procedendum si numerus propositus sit cum fractione: ponatur ex. gr. numerus 490536 $\frac{2}{5}$, cujus log-mus inveniendus: dividatur is per 100, quotientis 4905 $\frac{36}{100}$ log-mus, computata fractione, est ex Tab. 3. 6906715, cujus caracteristicam si augeamus binario, quot cyphis nempe constat divisor 100, emerget numeri propositi log-mus 5. 6906715. Q. e. f.

COROLLARIUM.

§. 66. Ex quibus pronum est colligere Canonem log-rum pro numeris Naturalibus, qui in Tabula nostra perductus est ab 1 ad 10000 extendi posse ad numeros valde magnos: quod quidem calculi tædium partim *Briggius*, partim *Ulacus* devorarunt, & ab 1 ad 10000 perduxerunt: haud tamen ulterius progressi sunt, quum parum emolumenti ex tanto labore Mathematicis acquirere noverint; quum, ut magnorum

rum precipuè numerorum differentiarum sensibiles reddantur, log-mi ad maximum numerum figurarum extendi deberent, ut infra (§. 68.) dicemus; quod molestiam supputandi in infinitum auget; sufficit ergo ut semel numeris Sinus, & Tangentes exprimentibus log-mi adsignati sint; qui præcipuus log-rum scopus. Sanè magnus ille Geometrarum Coryphæus *Newtonus* in sua methodo Fluxionum & Serierum Infinitarum per log-mos asymptotica hyperbolicos viam stravit, qua formulâ confectâ per seriem convergentem procedente, magnis numeris summo calculi compendio log-mi assignari possint, quin obiter notavit per suam Methodum detegi posse *Regulas utiles ad construendas Tabulas Sinuum & Tangentium Artificialium sine Naturalium auxilio*. Eum sequuti idem præstitere *Mercator*, *Gregorius*, & *Wallisius*, inter quos eminet vir summus *Hallejus*, qui de hisce convergentibus Seriebus Tractatum peculiarem conscripsit, actisque Regiæ Societatis inseruit. At hæc profundioris sunt indaginis, sublimioremque Geometriam redolent quam hic loci mentio sit facienda.

S C H O L I O N I.

§. 67. Ex hucusque dictis liquidò constat modus, quo log-mi numeris exprimentibus sinus, & Tangentes applicati sunt; numero enim dato quolibet Naturali Sinuum, vel Tangentium facillè per Problema præcedens numerus Artificialis, siue Logarithmicus assignatur. Notent tamen velim Tyrones numero ex. gr. 2909, qui est sinus unius minuti primi in Tabulis ordinariis, in quibus prostant tam sinus Naturales, quam Artificialis seu logarithmici, exscribim esse e regione log-

log-mum 6.4637261 ; non quia revera numerus hic fit log-mus illius , ex caracteristica enim 6 distimus numerum correspondentem constare debere septem figuris (§. 58.) , sed numerus ille tribus ultimis figuris mutilatus intelligi debet , revera enim est 29088821 nam log-mi non ad radium numerorum naturalium 10000000 , sed ad 100000.00000 computati sunt , cujus radii log-mus est 10.00000.00000 caracteristicam habens necessario 10 (§. cit.) sed postea tam ex numeris Naturalibus quam ex Logarithmicis tres ultima figura mutilata sunt , ut habita correctione ad calculatorum comoditatem simul prospiciatur. Rationem innuimus (§. 37 , 60).

SCHOLION II.

§. 68. Ceterum illud superest animadvertendum log-rum duorum proximorum differentiam eo minorem esse , quo numeri , quibus correspondent , sunt majores . Ex. gr. log-mi numerorum 21 & 22 differunt 202034 ; log-mi vero numerorum 234 & 235 differunt 18520 ; log-mi denique numerorum 3788 & 3789 habent differentiam 1146 , &c. Tandem ergo in numeris valde magnis evanescet log-rum differentia : ita numeri 2656385774 , & 2656385774 eundem habent log-mum 9.42422911 , differentia enim evanuit : unde apparet canonem exarandum esse non ad 100000.00 , sed ad 1.00000.00000 , ut differentiam habeamus , quæ ultimis figuris continetur , magnorum numerorum ; juxta quem canonem invenietur prioris numeri propositi log-mus 9.42429.12457 , posterioris 9.424229.11459 , in quibus patet differentiam esse binario .

E

PRO.

PROBLEMA VIII.

*Dato log-mo, qui accuratè in tabula occurrit
numerum correspondentem invenire.*

§. 69. Numerus inveniendus quot constet figuris apparet ex datâ caracteristica (§. 58.) quæ aut est 3, aut major, aut minor. Sit primum ex. gr. log-mus datus 3. 3199384 ; minimè habito respectu ad caracteristicam denotantem numerum inquirendum quatuor constare figuris tabulam suique deque revolvendo invenitur in columna, cujus index est 9 log-mus propositus, cui sinistrorium e regione adest numerus 208, huic ergo indicem 9 associando (§. 61.) habemus 2089 pro numero desiderato.

Si verò caracteristica fuerit minor 3, minimè ad eam habito respectu, inquirendus est log mus in tabula, quo invento assumendus est numerus correspondens, ut diximus, tanquam caracteristica log-mi esset 3 ; hinc ab eo numero demptis tot figuris quot unitatibus differt caracteristica log-mi propositi a numero 3 fiat fractio, cujus numerator sint figuræ abscissæ, denominator verò unitas cum totidem cyphris, quot figuræ sunt abscissæ. Ex. gr. quærendus sit numerus congruus log-mo 1. 7056927, suppositâ caracteristica 3, inveniemus in tabula numerum 5078 ; quum autem caracteristica 1 log mi propositi differat duabus unitatibus a numero 3, separandæ sunt a numero invento 5078 duæ ultimæ figuræ 78, atque dividendæ per 100, ut fiat fractio $\frac{78}{100}$; ergo numerus quæsitus est 5078. Si log mus propositus fuisset 2. 7056927, tunc numerus eidem congruus esset 5078 ; si fuisset 0. 7056927, tunc
erit

erit numerus $5\frac{11}{16}$. Si vero log-mus propositus esset 2.7050080, numerus eidem congruus invenietur per regulam 50718, hoc est 507. Patet ratio ex dictis, & §. 58).

Quod si característica data major sit numero 3, puta 7.8493580, tunc ab ea subtrahatur log-mus numeri 10, vel 100, vel 1000, &c. ita ut característica residuum sit 3, in nostro casu subtrahatur log-mus 4.0000000 numeri 10000; tunc facile assignatur log-mi hujus residui 3.8493580 numerum 7069 (§. 61) qui multiplicatus per 10000 (§. 65.) dat 70790000 pro numero quæsito. Q. e. f.

PROPOSITIO IX.

Dato log-mo, qui in Tabula accuratè non occurrit, numerum correspondentem invenire.

§. 70. Aut numerus propositus excedit 4.0000000, aut non; ponatur primum non excedere. Ex. gr. propositus sit log-mus 3.5232140: capiatur numerus 3335 conveniens log-mo 3.5230958 proximè minori dato: auferatur hic a proximè sequenti 3.5243961 majori dato, ita ut habeatur differentia 1302; idem log-mus proximè minor a proposito dematur, sic fiet differentia 1182. Inde inferatur, ut differentia prima 1302 ad secundam 1182, ita denominator futuræ fractionis ad libitum assumendus, ex. gr. 100, ad numeratorem, qui erit in nostro casu 9; igitur numerus 3335 cum fractione $\frac{9}{100}$ est congruus log-mo proposito.

Quod si log-mus datus, ex. gr. 7.7589982 excedit 4.0000000, in hoc casu subtrahatur ab illo log-mus numeri 10, vel 100, vel 1000, &c. ita tamen ut característica log mi residui remaneat

E 2 neat

neat 3; in nostro exemplo subtrahatur log-mus 4.000000 numeri 10000, quo facto residui 3.7589982 inveniatur per casum primum numerus congruus 5741 $\frac{1}{200}$, qui multiplicatus per 10000 (§.65) dat numerum quæsitum 5741100. Ratio horum omnium ex dictis, & proportionalium partium ratione fit abunde manifesta. Q. e. f.

PROPOSITIO X.

Dato log-mo negativo fractionem correspondentem invenire.

§. 71. Quoniam denominator cuiuscunque fractionis est ad suum numeratorem, prouti unitas ad eandem fractionem, summa log-rum denominatoris & fractionis æquabitur log-mo numeratoris; proinde si in serie decupla ad arbitrium sumatur denominator puta 10, vel 100, vel 1000, &c. summa log-rum hujus denominatoris & fractionis, qui datus est, dabit log-mum numeri qui inventus in tabula erit numerator fractionis quæsitæ cuius denominator statutus est, unde fractio quæsitæ innotescet. Illud tamen adnotandum, quum diximus sumi debere summam log-rum fractionis & denominatoris, hoc Algebraicè intelligendum; idest, quoniam log-mus fractionis est negativus, ut addatur hic log-mo denominatoris ab hoc subtrahendus est, ut innuimus (§. 62). Ex. gr. proponatur inquirenda fractio log mi negativi -0.1249388 , hic additus Algebraicè log-mo 1.000000 numeri 10 ad arbitrium adsumpto, hoc est, illo ab hoc subtracto, datur 0.8750622 log-mus nempe numeratoris, qui, quum in tabula exactè non inveniatur, exhibet (§. 70) $7\frac{1}{2}$ pro numeratore ferè exacto. hunc denique dividendo per 10 emerget fractio quæsitæ $\frac{75}{100}$, seu $\frac{3}{4}$. Q. e. f.

PRO-

PROPOSITIO XI.

Regulam auream Log-rum beneficio absolvere.

§.72. Proponantur primo tres termini, puta 52, 302, 421 quibus quartus sit inveniendus; quærantur in tabula log-um i. 7160033, 2. 4800069, 3. 6242821 correspondentes tribus datis terminis; hinc a log-rum secundi & tertii summâ 5. 1042890 dempto primi log-mo 1. 7160033, remanet log-mus 3.3882757 quarti quæsitæ, cui in tabula adscribitur e regione sinistrorsum numerus 244, & in indicis columna numerus 5, unde quartus quæsitus est 2445. (§.6.)

Sint secundò duo termini 61 & 122, & tertius investigandus. Quærantur in tabula log-mi 1.7853298, 2.0863598 datis congruentes, hinc a duplo 4.1727196 log-mi medii dempto log-mo primi, remanet log-mus 2.3873898, cui correspondet numerus 144 pro tertio desiderato.

Eodem ratiocinio si dati sint duo termini 82, 328 quibus medius inveniendus dimidium summæ log-rum 1.9138138, 2.5158738 terminorum datorum dat medii quæsitæ log-mum 2.2148438, cui in tabula correspondet numerus 164. Q.e.f.

S C H O L I O N.

§.73. Praxis adhuc fit facilior in calculis Trigonometricis, & qua in posterum utemur, si loco subtractionis primi termini log-mici substituatur additio residui ejusdem termini ad radium, siue ad duplum radii, si terminus major sit ipso radio, uti est in tangentibus angulorum majorum 45°, & ab summa totali radius extrahatur, vel duplum radii in secundo casu; quod admodum facile est, subtrahendo scilicet unitatem, vel binarium numerum in altero casu a correspondenti cyphra versus sinistram. Ex.gr. sit log-mus aliquis 9.716068 a summa duorum intermediarum 1.5314500, &

9.931374 subtrahendus ; ejus residuum ad radium 10.0000000 est 2839832, quod additum duobus intermediis dat summam 11.7669706, ex qua summâ dempto radio, hoc est, primâ unitate a finisfris, remanet log-mus quarti termini quaesitus 1.7669706. Ratio patet ; quum enim a summa log-rum secundi & tertii termini subtrahi debeat log-mus primi, ut log-mus quarti prodat, & præterea, vice hujus subtractionis, ejusdem residuum ad radium adjunctum fit, manifestum est ex totali hac summâ integer radius subtrahi debere. Residuum hoc levi negotio habetur, sumendo semper cujuslibet cyphra numeri dati complementum ad 9, præterquam primâ ad dextram, cujus complementum ad 10 sumi debet. Ex quibus omnibus hucusque pensitatis jam liquidò apparet, quantum utilitatis log-rum contemplatio atque usus in Mathematicæ præflet, ita ut eorum adminiculo molestissimæ Arithmeticae operationes ferè ad solam additionem reductæ sint, quod ulterius in exemplis capite sequenti propositis dilucidabitur. Sanè hujus calculandi modi per log-mos fidem subleſſam reddere tentaverunt Tycho Brahe, & Argolus ; quin Keplerus pronuntiavit, Turpe esse Professori Mathematico super compendio aliquo calculi pueriliter exultare, interimque sine demonstratione legitimâ formam calculi in usum recipere, quæ olim quum minimè metueris, in erroris insidias te protrahere posset. Postea verò, utpote sagax erat Kepleri ingenium, quum vim demonstrationis se affecutus, palinodiam canere coactus inquit ; Est nova quædam Arithmetica seu Compendium, quo post Numerorum notitiam nullum nec admirabilius. nec utilius solvendi pleraque Problemata calculateria, præsertim in doctrina triangulorum, citra multiplicationis, divisionis, Radicumque extractionis in numeris prolixis labores molestissimos.

CA.

C A P U T III.

71

De triangulorum Planorum resolutione.

P R O P O S I T I O.

In omni triangulo latera eandem proportionem habent inter se quam sinus angulorum ipsis oppositorum.

§. 74. **S**IT triangulum quodcunque ABC, cui Fig. 7, & 8
circumscribatur circulus EHCG *; *El. 4. Pr. 9
ex hujus centro D ducantur radii DH DG DE
bifariam secantes latera BC AC AB, item ra-
dii DA DB DC. Quoniam igitur angulus ad
centrum ADB duplus est anguli ad periphe-
riam ACB. *, erit illius dimidium ADE ex *El. 3. Pr. 20
constr. æquale angulo ACB. Eadem ratione
angulus ADG æquatur angulo ABC, & angu-
lus HDC angulo BAC: fed AF AI CK sunt
sinus angulorum ADE ADG CDH, hoc est,
ACB ABC CAB, eodemque tempore sunt se-
misses laterum, quum semisses eandem ratio-
nem habeant quam tota, patet latera AB AC
CB esse ut sinus AF AI CK angulorum C B
& A ipsis lateribus oppositorum. Q.E.D.

S E C T I O I.

De triangulorum rectangulorum resolutione.

P R O B L E M A I.

*Dato uno crurum puta AC, & uno angulo-
rum acutorum puta A invenire* Fig. 9
hypothensam AB.

§. 75. Quoniam angulum A notum supposi-
mus,

E 4

* *El. l. 1. Pr. 32*
Cor. 6

mus, etiam angulus B innotescet; compositus nempe hic ex differentia anguli dati A & recti *. Proinde (§. præc.) inferatur ut AC prouti sinus anguli B ad idem crus AC, prouti notum in partibus, ita AB sinus nempe anguli recti C ad eandem hypotenusam, quæ ex primis tribus terminis notis nota fiet in iisdem partibus dati cruris AC. Q. e. i.

E X E M P L U M.

Fig. 10

Sit Turris B oppugnanda, & ex litore A suggestus tormentorum elevandus sit, quæritur distantia AB, ut cognoscatur cujus magnitudinis tormenta adhibenda sint, ut desideratum effectum fortiantur. In litore ex parte C tandiu ultro citroque versetur cum Instrumento Goniometrico passim in Practica Geometria descripto, donec statio eligatur in C, in qua collimando versus puncta B & A

R. L. S. GA 2839832

• 1. 5514500

Sum. 1. 8354332 L. BA

efficiatur angulus ad Crectus. His positis mensuretur distantia CA ex. gr. passuum 356, & eodem instrumento angulus A ex. gr. 58° 40', erit igitur angulus ad B 31°

20': proinde ut log-mus sinus CA hujus anguli, qui in Tab. sinuum est 9.716068 ad CA passuum 356, cujus numeri log-mus ex Tab. Log-rum est 1.5514500 ita log-mus sinus BA anguli recti A 10.0000000 ad quartum, qui provenit si a summa secundi termini ac tertii auferatur primus (§. 72) vel si secundo termino addatur residuum log-mi termini primi (§. 73) ergo log-mus quarti est 1.8354332, cui in Tab. Log-rum correspondent passus 684, & pedes 3 præter propter pro quaesita distantia AB.

SCHOL.

SCHOLIUM.

§. 76. Supponatur modò angulum ad A inventum fuisse $58^{\circ} 50'$: instituto calculo methòdo expòsità juxta hanc positionem invenietur log-mus hypòthenusæ AB 1.8375151, cui correspondent passus 627 & pedes 4. Differentia ergo distantia hujus a priori calculata est passuum 3 & pedem 1, quæ profectò oritur ab angulo A , qui in hoc calculo major priori supponitur minutis 10. Hac idem adnotavimus ut advertatur, quod si in angulo mensurando error saltem minutorum 10 committatur vel in excessu, vel in defectu, distantiam quasitam majorem verà, vel minorem existere differentia quidem sensibili, & non contemnendâ in magnis præcipuè distantiiis. Unde patet ratio quare instrumentum Goniometricum non solum exactè, verum etiam ad singula dena minuta divisum habere oporteat, scilicet ut error omnis sensibilis præcaveri possit in angulo mensurando, a quo distantiarum exactitudo dependet.

PROBLEMA II.

Dato uno crurum puta AC , & uno angulorum Fig. 8
acutiorum puta A invenire crus
reliquum CB .

§. 77. Problema hoc eodem modo resolvitur ac præcedens. Fiat enim (§. 74) ut sinus AC anguli B , qui ex dato A ignorari non potest, ad idem crus AC notum, ita sinus CB anguli noti A ad idem crus CB , quod ex primis tribus terminis notis in eadem mensura ac positum fuit AC innotescet. Q. e. i.

EXEM-

E X E M P L U M.

Fig. 10

Sit in *C* electa flatio anguli recti, & in instrumento Goniometrico mensuratus angulus *A* exactè $38^{\circ} 40'$, crur vero *AC* passuum 356; erit angulus *B*

R. L. *AC* 28;9832

L. N. 356 1.5514500

L. S. *CB* 9.9315374Sum. cor. 1.17679706 L. N. $584\frac{1}{2}$

$31^{\circ} 20'$; inferatur ut sinus *AC* anguli *B* ad numerum 356 ita sinus *CB* anguli *A* ad crur quæsitum *CB*, quod invenietur passuum 584 $\frac{1}{2}$ pedum 4.

P R O B L E M A III.

Fig. 9

Datâ hypotenusâ *AB* & uno crurum puta *AC* invenire angulum oppositum *B* vel comprehensum *A*.

§. 78. Inferatur (§. 74) ut hypotenusâ *AB* nota ad eandem prouti est sinus totus, ita crur *AC* notum ad idem *AC* prouti sinus anguli *B* oppositi, quo cognito etiam angulus *A* cognoscetur. Q. e. i.

E X E M P L U M.

Ponamus modò propugnaculi alicujus angulum *DEF* mensurari debere, sed sine instrumento goniometrico. Ex punto aliquo puta *E* collineetur per puncta *B* & *F*, ita ut linea *EF* faciei propugnaculi sit in directum cum *BE*, similique modo linea *BA* sit cum *DB*; mensurentur deindè duæ lineæ *EB* & *AB* ita ut sint æquales, puta passuum 36; distantia item inter duo loca signata *E* & *A* mensuretur & sit passuum 56, cujus dimidium, nempe pas. 28, est recta *CA*. Habemus igitur triangulum

CBA

CBA ad C rectangulum *, in quo datur hypothe- *El.I. Pr.8
 nusa BA & crus CA : ergo ex dictis erit ut BA
 36 pas. ad eandem BA tanquam radium 10000000
 ita CA 28 pas. ad CA fi.
 num anguli CBA; seu sum- R. L. N. 36 8.4436975
 ma log-mi numeri 28, & L. N 28 1.4471580
 residui log-mi numeri 36 Sum, 9.8908555 L. Ang. CBA
 dat log-mum sinus an-
 guli quaesiti, cui correspondent $31^{\circ} 3'$, hujus du-
 plum $102^{\circ} 6'$ est angulus obtusus propugnaculi
 quaesitus.

PROBLEMA IV.

Datà hypotenusà AB, & uno acutorum
 puta A invenire crus oppositum CB,
 vel adjacens AC.

Fig. 9

§. 79. Dicatur, ut AB tanquam radius ad
 eandem AB notam, ita CB tanquam sinus eta-
 bula excerptus, qui convenit angulo dato, ad
 idem crus CB in patte datæ AB; quum autem
 dato uno acutorum reliquus etiam datus intel-
 ligitur, patet latus adjacens AC innotescere, si
 tanquam dato angulo B oppositum considere-
 tur. Q. e. i.

EXEMPLUM.

Sit inveniendā distantia cB scopuli c a Turre
 B. Ope instrumenti goniometrici in scopulo colli-
 neetur versus puncta B & a, ita ut efficiatur an-
 gulus Bca rectus. His positis per Probl. I. inve-
 niatur hypotenusà BA trianguli BAC, cui adji-
 ciendo partem Aa, vel demendo si punctum a in-
 ter A & B fuerit, mensuratam ex. gr. pas. 22
 nova prodit hypotenusà Ba trianguli Bca pas. 706
 & ped.

Fig. 10

Fig. 3. Capiatur eodem instrumento angulus caB, qui fit 56° 28'. Quibus datis nullo negotio cognoscetur distantia CB & distantia ca si fiat ut si-

R. L. R.	o	o
L. N. 706½	2.8401735	
L. S. An. caB	9.9209393	

Sum. cor. 2.7701128 L. N. 589

R. L. R.	o	o
L. N. 706½	2.8491735	
L. S. An. aBc	9.7422710	

Sum. cor. 2.5914445 L. N. 390½

Ba *pas.* 706½ ita sinus anguli noti a, qui excerpatur ex Tab., ad eandem CB inveniendam in *pas.* vel a summa log rum numeri 706½ & sinus anguli 56° 28' dempro logmo radii, residuum est log mus conveniens cruri quaesito, cui correspondent ferè *passus* 589. Eodem modo invenitur distantia ca: quum enim angulus a fit 56° 28', erit aBc 33° 32'; ergò si a summa log rum numeri 706½ & sinus anguli 33° 22' detrabatur log mus radii provenit log mus conveniens cruri ca, *passuum* nempe 390 & *ped.* 2 ferè.

PROBLEMA V.

Fig. 9 **Datis cruribus AC CB invenire angulum alterutrum acutorum A vel B, & hypotenusam AB.**

§. 80. Assumpto uno ex cruribus datis puta AC tanquam radio circuli descripti centro A, CB erit tangens anguli A (§. 25), proinde orietur hæc proportio, ut crus AC notum ad idem AC, prouti est radius, ita CB etiam ex sup.

suppositione notum ad eandem CB tangentem anguli A ; ex primis igitur tribus terminis notis quartus etiam innotescet, cui ex Tabula in columna Tangentium assignatur conveniens angulus, qui ex 90 subductus dat alterum B. Inventis angulis facillè per Probl. 1 invenitur hypotenusâ. Q. e. i.

E X E M P L U M.

Ponatur ex planitie circumposita montis alicujus prærupti ac turris in ejus vertice posita altitudo AC mensurari debere absque Instrumento Geometrico. Jam igitur trianguli rectanguli Acb ad libitum formati in plano non nisi crura cb mensurari possunt, patet nos voricompetes fieri non posse, nisi alia ineatur via, ut angulum ad b veniemur. In puncto ergo b infigatur baculum mb perpendiculariter ad planum horizontale ca tantæ altitudinis ut oculus per ejus extremitatem m versus altitudinem AC collineare valeat; ex. gr. pedum 5; item aliud baculum Bk ejusdem altitudinis in aliqua a priori distantia sit etiam ad planum perpendicularare, ita ut collimando per puncta B & m habeatur recta BmC parallela plano horizontali ck. Quibus positis tandiu versetur oculus in terra per rectam ck productam, ut extremitates baculi & turris appareant in recta aBA; notetur punctum a. In parvulo triangulo ad k rectangulo si exactè mensuretur crura ka, ex. gr. ped. 7, dabuntur tantummodo duo crura Bk & ka, fiat ergo ex Probl. ut crura ka ped. 7 ad idem ka tanquam radium, ita kB ped. 5 ad idem KB pro-
uti est tangens anguli oppositi Bak, hoc est summa Residui Log. mi numeri 7 & log mi numeri 5

Fig. 12

R. L. N. 7	9. 1549020	
L. N. 5	6989700	
Sum.	9. 8538720	L. T. An. Bak
	68	

exprimit log-mum tangentis anguli Bak, cui conveniunt ex Tab. 33^o 32'; huic angulo aequatur angulus ABC: unde in triangulo ABC prater crus CB notum ped. 255 datur etiam angulus ad-

R.L.S.An.CAB 894943

L.N. 255 2.4065402

L.S.An.ABC 9.7643080

Sum.cor. 2.2603425 L.N. 182

jacens ABC; ergo per Probl. 11 notum fit crus AC ped. circiter 182, cui addita a titudine CC ped. 5 prodis altitudo quaesita AC pedum 187.

Dat.s	Inv.	Datis	In .
1 A, C	AC	16 AB, BC	A
2 A, C	AB	17 AB, BC	C
3 A, C	BC	18 AB, BC	AC
4 A, AC	AB	19 AB, AC	A
5 A, AC	BC	20 AB, AC	C
6 A, AC	C*	21 AB, AC	BC
7 A, AB	AC	22 C, AC	AB
8 A, AB	BC	23 C, AC	BC
9 A, AB	C*	24 C, AC	A*
10 A, BC	AC	25 C, CB	AC
11 A, BC	AB	26 C, CB	AB
12 A, BC	C*	27 C, CB	A*
13 AC, BC	A	28 C, AB	AC
14 AC, BC	C	29 C, AB	CB
15 AC, BC	AB	30 C, AB	A*

SCHOLION.

§. 81. Casus omnes trianguli reſt anguli, qui combinari poſſunt datis ejuſdem duabus partibus prater reſtum, ſi ſpecialiter conſiderentur, ſunt numero 30, ut ex laterculo appoſito manifeſtum eſt: Ubi adnotandum caſus ſex, qui ſtel'ulis notati ſunt ex ſola Prop. 32 El. lib. 1 innotere, dato enim uno acutorum, reliquus datus etiam eſt. Si-

militer caſus 15 18 21. per Prop. 47 Elem. lib. 1 facilius reſolvuntur quam per Trigonometriam, ac proinde nulla de his fit mentio. Caſus vero 1. 2. 3, qui unico Problemate comprehenduntur, ſcilicet datis in triangulo tribus angulis unum ex lateribus invenire per Trigonometriam inſolubiles ſunt; nam ex ſola angulorum cognitione laterum qui-

79

quidem proportio, non vero quantitas innatescit, eidem enim angulo majus vel minus latus indiscriminatim opponi potest, proinde nisi aliquod latus notum fiat, reliqua nequeunt determinari; quod etiam de triangulo obliquangulo dictum sit. Ceterum reliqui casus per quinque apposita Problemata resolvuntur; Problema enim I continet casus 7 10 25 28; II. continet casus 8 11 26 29; III. casus 13 14 19 20; IV. casus 4 5 22 23; V denique 16 17.

S E C T I O II.

De Triangulorum Obliquangulorum resolutione.

P R O B L E M A I.

Datis duobus Angulis puta B & C, & uno laterum puta BC reliqua duo AB AC invenire. Fig. 15

§. 82. Quoniam duo anguli B & C dati supponuntur etiam tertius A notus erit, proinde fiat ut BC tanquam sinus anguli noti A ad idem latus BC notum in aliquâ mensurâ, ita AB prouti est sinus anguli dati C ad idem AB, vel ita AC prouti est sinus anguli dati B, ad idem A; ex primis igitur tribus terminis notis quartus etiam innatescet. Q. e. i.

E X E M P L U M.

Sit lacus alicujus longitudo CB mensuranda; ponantur in locis B & C maximæ distantie præterpropter cognita signa quæcunque, itaut locus C per B, B vicissim per C collineari possit; eligatur inde ad arbitrium punctum aliquod extra lacus puta A, eâ conditione ut signum positum in A a Fig. 16

A a locis B & C videri queat, & insuper latus

R. L. S. An. C 3023455

L. N. 72 1. 8578325

L. S. An. A 9. 8794195

Sum. cor. 2. 1390975 L.N. 137

R. L. S. An. C 3023455

L. N. 72 1. 8573325

L. S. An. B 9. 8305091

Su. cor. 1. 98118771 L. N. 94

*ex. gr. pas. 72, angulus
verò ad B instrumento cru-
tus sit 42° 36', & an-
gulus ad C 29° 54'. Hi-
sce positis ut cognoscatur
in triangulo ABC latus BC
inferatur, ut BA tan-
quam finus anguli 29°
54' ad idem BA passuum
72, ita BC tanquam fi-
nus anguli obtusi A 107° 30', sine ejus com-
plementi 72° 30', ad idem BC inveniendum; ac
per consequens a summa log-rum residui log-mi
finus anguli 29° 54', numeri 72, & finus an-
guli 72° 30' dempto radio remaret log-mus nu-
meri lateri CB congruus, cui competunt passus
138 ferè. Eodem modo invenitur latus CA pas-
sus 98 ferè.*

PROBLEMA II.

Fig. 15 *Datis duobus lateribus CB AC & angulo
uni eorum opposito puta B invenire
angulos reliquos A & C,
& tertium latus AB.*

§. 83. Inferatur, ut AC latus notum ad idem
AC, prouti est sinus anguli noti B, ita latus
CB notum ad idem CB prouti est sinus anguli
quæsitæ A, ex primis igitur tribus terminis
notis quartus non ignorari necesse est, qui ex-
hibet sinum anguli A; invento angulo A &
dato

dato B mox invenitur angulus C ex nota triangulorum proprietate, & latus CB. Q. e. i.

EXEMPLUM.

Sit angulus EAD demus alicujus F mensurandus: assumptis ad arbitrium lateribus AC AB in directum cum AE AD fiet triangulum ACB habens angulum CAB æqualem quæsito DAE: mensurentur duo latera AC puta pass. 7, CB pass. 15, & insuper angulus B $24^{\circ} 52'$. Hisce positis erit latus AC notum pass. 7 ad idem AC pariter notum, prouti est sinus anguli $24^{\circ} 52'$, ita CB notum pass. 15 ad idem CB inveniendum, prouti est sinus anguli CAB: unde a summa log-rum residui numeri 7, sinus anguli $24^{\circ} 52'$, numeri 15 dempto radio, remanet log-mus sinus anguli CAB quæsitus, cui competunt $64^{\circ} 18'$ si sit acutus, vel $115^{\circ} 42'$ si obtusus: ac proinde angulo C ex prima hyp. competunt $90^{\circ} 50'$, & ex secunda $39^{\circ} 26'$; facto denique calculo juxta primam hypoth. pro latere AB inveniendò, hoc erit pass. $10\frac{1}{2}$ ferè, & juxta secundam pass. $16\frac{1}{2}$.

R. L. N. 7	9. 1549020
L. S. An. B	9. 6237743
L. N. 15	1. 1760912
Sum.cor.	9. 9547675 L.S.An.CAB

R. L. S. An. B	3762257
L. N. 7	8450980
L. S. An. $89^{\circ} 10'$	9. 9999541
Sum.cor.	1. 2212778 L.N. $16\frac{1}{2}$

R. L. S. An. B	3762257
L. N. 7	8450980
L. S. An. $39^{\circ} 26'$	9. 8028968
Sum.cor.	1. 0242205 L.N. $10\frac{1}{2}$

SCHOLION.

§. 84. Ex Problem. resolutione in exemplo satis liquet, nequidem sufficere in hisce casibus obliquangu-

F

h

li tres partes tantum notas exhibere, nempe duo latera & unum angulum uni eorum oppositum, sed etiam necessarium esse unum e duobus angulis quantitate ignotis specie saltem notum esse, ut tertium latus & quantitatem reliquorum angulorum determinemus. Ita in exemplo si præter angulum B notum quantitate alteruter ignotorum C vel A specie cognoscatur, puta sit C acutus, statim confecto calculo angulus A determinatur $115^{\circ} 42'$, latus vero AB pas. $16\frac{1}{2}$ fere; si vero C sit obtusus, angulus A est $64^{\circ} 18'$, & latus AB pas. $16\frac{1}{2}$. Quod tamen quoad praxim parvi est momenti; quum facile ex ipsa angulorum observatione species eorundem determinetur.

PROBLEMA III.

- Fig. 15 Datis duobus lateribus puta AB AC, & angulo intercepto A invenire reliquos duos angulos B & C, & tertium latus BC.

§. 85. Angulus datus A vel obtusus est, vel acutus; si primum, perpendicularis demissa BD ex alterutro angulorum ignotorum, puta B, qui necessario acuti esse debent*, cadet extra triangulum versus partem anguli acuti
 El.I.1.Pr.32 BAD in latus oppositum CA productum, & efformabit rectangulum triangulum BAD, in quo datur acutus BAD & hypotenusa AB; ergo per Problema IV invenietur perpendicularum BD & latus AD, quo priori CA addito, provenit latus CD: rursus in triangulo rectangulo CDB datis duobus cruribus CD, BD invenietur hypotenusa BC, & angulus C per Probl.V, quo cognito etiam ABC innotescit.
 Fig. 16 Quod si angulus A sit acutus, in latus majus AC demittatur perpendicularis BD ex angulo op-

opposito ignoto B, quæ necessariò intra triangulum cadet, sive angulus B acutus, vel obtusus supponatur; reliquus enim angulus C neque rektus, neque obtusus esse potest, aliter latus AB major foret latere AC contra hypoth. * *El. I. 1 Pr. 32*
 proinde fiet triangulum rektangulum BAD in quo datur angulus A & hypotenusa AB, nota erunt igitur ex Problemate perpendicularis BD & crus AD, quod si subducatur ex AC residuum sit DC; rursum in triangulo BDC nota erunt crura BD & DC, ergo ex Probl. V non ignorabitur angulus C; quo cognito nota fiet hypotenusa BC, & angulus CBA. Q. e. i. *Cor. 5 ex Whiston.*

EXEMPLUM.

Sit invenienda duorum propugnaculorum B & C distantia BC: electa statione in A prouti opportunior visa fuerit, mensurentur duo latera AB passuum 26, AC pass. 112, & angulus A 39°. 54'. Quoniam igitur angulus datus A est acutus, demittatur perpendiculum BD

ex angulo B opposito majori lateri AC, hoc cadet intra triangulum, ac efficiet duo triangula rektangula ABD BDC, in quorum primo datur hypotenusa AB & angulus A, ergo innotescet crus AD pass. 20 ferè & BD pass. 17 ferè: ac per consequens si demantur pass. 20 ab AC pass. 112, remanet DC pass. 92; hisce positis triangulum rektangulum BDC exhibet duo crura BD DC nota, unde per Probl.

R.L.R.	0	0
L.N. 26. AB	1.4149733	
L.S.An. ABD	9.8848889	
Sum.cor.	1.2998622	L.N. 20

R.L.R.	0	0
L.N. 26. AB	1.4149733	
L.S.An. A	9.8071626	
Sum.cor.	1.2221359	L.N. 17

R.L.N. 92 DC	8.0362122	
L.R. DC	10.0000000	
L.N. 17 BD	1.2221359	
Sum.cor.	9.2583481	L.T.An. BCD

habet duo crura BD DC nota, unde per Probl.

F. 2

V in.

Fig. 17

	84	
R. L. S. An. C	7487228	
i N. 26 AB	1.4149733	
L. S. An. A	9.8071626	
Sum cor.	1.9704587	L.N.94

V inuenietur angulus C
 $10^{\circ} 17'$, & hypothenu-
 sa sive distantia quasi-
 ta BC pas 94.

S C H O L I O N.

§. 86. Non me latet, Problematis hujus solutionem alia prorsus metodo a Trigonometricis exhiberi, quæ etsi ingeniosior sit & paulò expeditior ad calculum perficiendum, prolixior tamen demonstrationem requirit; quum igitur idem præstari animaduertimus per hanc viam, eam potius utpote faciliorem, & a præcedentibus deductam calcare statuimus, quam alio modo præter necessitatem Propositionibus multiplicitate Tyronum memoriam defatigare. Eam procul dubio rejecissem si præter duo latera nota & angulum comprehensum, alteruter angulorum ignotorum specie notus esse deberet ad eorum quantitatem determinandam, (ut perperam a quibusdam in hujus methodi explicatione factum video); quum prolixiori illo modo prorsus evitari possit.

P R O B L E M A IV.

*Datis tribus lateribus AB BC CA inuenire
 angulum quemvis.*

*El. I. Pr. 32
 C. 12*

§. 87. Si tria latera æqualia sint, jam patet angulorum quantitas*; si saltem duo, tunc ex angulo æqualibus lateribus comprehensio ductâ perpendiculari triangulum resolvitur in duo rectangula æqualia, in quibus duo crura data sunt, reliqua igitur (§. 30.) innotescunt. Si omnia sint inæqualia, centro facto in angulo A majori lateri BC opposito, intervallo lateris minoris AB describatur circulus; hinc produ-
 catur

Fig 18

atur CA in H, & ex puncto A demittatur perpendicularis AD in latus BC. Hisce positis latus BC, in quo cadit perpendicularis, est ad CH summam duorum reliquorum laterum CA AB, ut CF differentia horum duorum laterum ad CG*, quæ, quum BD DG sint æqualia*, denotat differentiam inter BD & DC segmenta a perpendiculo facta; ex primis igitur tribus terminis notis in proportionem innotescet hæc differentia GC, quæ si ab latere CB dematur, residuum sit chorda BG, cujus dimidium est BD, quo dempto ab tota BC, remanet alterum segmentum DC: datis proinde in rectangulis ABD ADC duobus lateribus AB BD & AC CD, noti sunt anguli C & B, atque A. Q. e. i.

E X E M P L U M.

Sit Lunulæ alicujus irregularis fortificatoriæ angulus CAB mensurandus. Supponatur recta CB per angulos C & B ducta, ita ut constituat triangulum CAB, cujus latus CA sit pas. 56, AB 42, CB verò 82. Centro A intervallo lateris minoris AB intelligatur descriptus circulus, qui exhibet differentiam CF pas. 14 laterum AC AB: quum ergo sit CB pas. 82 ad CA cum AB pas. 98, ita CF pas. 14 ad CG, fiet hac nota pas. 17 ferè; ac proinde GB erit pas. 65, DB pas. $32\frac{1}{2}$; & CD pas. $49\frac{1}{2}$: unde facillè invenientur (§. 78) anguli CAD $62^{\circ} 6'$ DAB $52^{\circ} 56'$, cujus aggregatum est angulus quadratus A $115^{\circ} 2'$.

Fig. 19

$$\begin{array}{r} \text{R.L.N. } 56 \text{ CA } 8.2518120 \\ \text{L.N. } 49\frac{1}{2} \text{ CD } 1.6945830 \\ \text{L.S.R. CA } 10.0000000 \end{array}$$

$$\text{Sum.cor. } 9.9463950 \quad \text{L.S.An.CAD}$$

$$\begin{array}{r} \text{R.L.N. } 42 \text{ AB } 8.3767907 \\ \text{L.N. } 32\frac{1}{2} \text{ CD } 1.5051958 \\ \text{L.S.R. } 10.0000000 \end{array}$$

$$\text{Sum.cor. } 9.9012405 \quad \text{L.S.An.DAB}$$

F 3 LI.

LIBER SECUNDUS

Sphæricam Trigonometriam
complectens.

CAPUT I.

De Doctrina Sphærica.

DEFINITIO I.

Fig. 20

§. 1.



Sphæram dicimus corpus solidum ABCED unicâ curvâ superficie terminatum, ad quam si a puncto intra ipsum posito A, quod *centrum* appellatur, ducantur utcumque rectæ linæ AB AC, &c. semper sunt inter se æquales.

DEFINITIO II.

§. 2. Si unaquæque ex his rectis, puta CA vel BA, quæ *Sphærae radii* dicuntur, versus partem oppositam producantur ita ut eandem superficiem contingant in D & E, hoc est, si radii duo CA AD, & BA AE sint in directum, linæ CD BE sunt *sphærae diametri*: quod si ulterius diametrum unam CD ita fixam concipiamus, ut *sphæra* circa ipsam revolvatur, dicitur etiam *Axis sphærae*.

DEFINITIO III.

§. 3. Concipiamus modo *sphæram* hanc ita dividi debere ut planum dividens per centrum A tran-

A transeat, jam illud manifestum est, planum sectionis necessario circulum esse debere; rectæ enim quæcunque ex centro A ad circumferentiam Sectionis ductæ sunt semper æquales (§. 1) ac per consequens circumferentia sectionis est peripheria circuli; hi porro ob sectionem per centrum factam dicuntur *circuli maximi*; si enim planum dividens concipiatur per centrum non transire, planum sectionis continuo circulos exhibet eo minores quo ab eodem centro magis distat; nam in circulo, unde & in Sphæra, nullam rectam duci posse majorem diametro demonstravit *Euclides*. Nos tamen non nisi circulos maximos contemplabimus. Ex quibus luce clarius meridianâ infertur

COROLLARIUM I.

§. 4. Infinitos circulos maximos concipere possumus in superficie sphericâ inter se æquales & communi centro descriptos, quin ipsam esse aggregatum horum circulorum.

COROLLARIUM II.

§. 5. Circuli maximi æqualiter se interse. *Fig. 21*
cant: nam duo AEBF CFDE centrum G commune habent, unde linea FE quæ per ipsum ducitur, est etiam utrique circulo communis diameter, proinde hæc duos æquales circulos dividit in duos æquales semicirculos. Unde si dati duo arcus AD AE circulorum maximorum se interfecantes in puncto A producantur, convenient iterum in puncto B diametraliter priori A opposito, atque erunt arcus AEB ADB semicirculi.

COROLLARIUM III.

§. 6. Circuli, qui æqualiter se intersecant, sunt maximi in sphaera. Positis enim portionibus æqualibus FAE FBE FCE FDE , erit FB diameter communis utrique circulo $CFDE$ $FAEB$; ducantur modò per centrum G rectæ CD AB , erunt AG GF , utpote radii, æquales; item FG GC , GD GE , GE GB ; proinde patet punctum G esse centrum sphaeræ (§. 1); ergo circuli, qui per hoc centrum transeunt, sunt maximi.

DEFINITIO IV.

§. 7. Angulus EAC , qui a duobus arcibus EA AC in superficie sphaeræ se intersecantibus comprehenditur, dicitur *sphaericus*, ac per consequens est inclinatio duorum planorum per arcus ductorum se in sphaerâ intersecantium: Quoniam autem hujus tractatus institutum est circulos tantum maximos considerare, patet hic agi tantum de angulis sphaericis ab arcibus horum circulorum efformatis; quin & in posterum pro arcibus & circulis semper arcus & circuli maximi sunt intelligendi, nisi aliter præcisè moneamus. Quod si per hos arcus EA CA planum transire concipiatur, liquet eandem esse inclinatum planorum $EABF$ $ACBD$ ac arcuum AE AC , quum hi sint illorum extremitates.

DEFINITIO V.

Fig. 12

§. 8. Si in sphaera circulus aliquis ECF ita alio BCD insilat, ut angulos ECD ECB æquales efficiat, ad se invicem perpendiculares esse,

an-

anguli verò ECD ECB recti dicuntur; similiter si idem circulus ita in situ ACG inclinaretur, ut angulus ACB major esset recto EGB , ACD verò minor recto ECD ; prior angulus ACB diceretur *obtusus*, & ACD *acutus*, ut in rectilineis. Ex quibus inferitur

COROLLARIUM I.

§. 9. Arcus ACG incidens in alium BCD efficit duos angulos vel rectos, vel duobus rectis æquipollentes. Si enim supponamus arcum ACG cum BCD efficere angulum ACB obtusum, ACD verò acutum, atque alium arcum ECF cum BCD angulos ECD ECB rectos, patet, quod si ab obtuso angulo ACB portio ECA dematur, acutoque ACD addatur, obtusum angulum cum acuto æquales esse duobus rectis ECB ECD .

COROLLARIUM II.

§. 10. Anguli circa punctum C intersectionis duorum arcuum BCD ACG sunt simul quatuor rectis æquales: angulus enim obtusus ACB cum acuto ACD duobus rectis æquipollet, ut etiam anguli GCD GCB ex alia parte; ergo omnes quatuor rectos efficiunt.

COROLLARIUM III.

§. 11. Anguli verticales ACB DCG , & ACD BCG æquales sunt; nam arcus ACG incidens in arcum DCB efficit angulos BCA ACD æquales duobus rectis; ita arcus DCB incidens in arcum ACG efficit duos angulos ACD DCG duobus rectis æquales, ergò, si angulus com-
pis

nis dematur ACD , remanent ACB DCG æquales; eadem ratione æquales sunt ACD BCG .

DEFINITIO VI.

Fig. 23 §. 12. *Polus* circuli in superficie sphaeræ descripti dicitur punctum illud A , a quo ductæ rectæ AB AC AD &c. ad illius circumferentiam sunt semper æquales.

COROLLARIUM I.

§. 13. Quilibet circulus in Sphaera descriptus duos polos diametraliter oppositos habet; si enim ducta concipiatur a polo A per centrum diameter Aa , hæc dividet circulum $ABaE$ in duos semicirculos ABa aEA ; sed semicirculus BAE divisus est æqualiter in duos quadrantes AB AE , ob subtenfas ex suppositione æquales; ergo etiam Ea Ba sunt quadrantes, per consequens subtenfæ sunt æquales; & quia idem demonstratur si quæcunque aliæ rectæ ducantur a puncto a , patet ex Def. hoc esse polum alterum circuli $BCED$.

COROLLARIUM II.

§. 14. Arcus intercepti a circulo, ejusque polo sunt quadrantes; rectæ enim ex Def. AB AE AC AD aB aE &c. subtenfæ sunt æquales.

COROLLARIUM III.

§. 15. Si arcus AB Ba comprehensi inter circulum BCE ejusque polos A & a sint quadrantes, necessario $ABaE$ arcus circuli maximi esse

se debet: diameter enim sphaerae Aa est etiam diameter circuli ABaE.

COROLLARIUM IV.

§. 16. Circulus BCED, per cuius polos A & a alter ABaE transit, per huius polos D & C vicissim transit: si enim semicirculi BCE BDE dividantur bifariam in C & D, erunt arcus CB CE DE DB AB AE Ba Ea æquales, nempe quadrantes æqualium circulorum (§. 5), proinde subtensæ ductæ CB CE, DB DE, CA DA &c. sunt etiam æquales, ergo ex Def. C & D sunt poli circuli ABaE.

COROLLARIUM V.

§. 17. Arcus circuli AG perpendiculariter super alio AEBN insistens si producat per huius polos C & F transit; planum enim transiens per circulum ACB perpendiculariter insistere plano circuli AEBN ex Elementis solidis manifestum est; ergo si ex centro D perpendicularis diameter CDF super circulo AEBN excutetur, liquet angulos CDE CDN CDS &c. esse rectos, hoc est æquales; unde etiam tales erunt rectæ CE CN CS; erit igitur C polus unus & F alter ex Def.

Fig. 24

COROLLARIUM VI.

§. 18. Circulus FECA, qui per polos F & C alterius AEBN transit, huic perpendiculariter insistit; quum enim in C sit polus, erunt rectæ CE CN CS &c. æquales, sive anguli CDE CDN, CDS æquales, hoc est recti; ergo planum transiens per circulum FECA perpendi-

cu-

•El.II.xi Pr.iv *culare est plano AEBN, ac per consequens circulus ille huic est perpendicularis.*

DEFINITIO VII.

§. 19. *Mensura anguli sphaerici cuiusculunque ACE est arcus AE circuli, cuius polus C est in ipso angulo: quum enim mensura anguli ACE eadem sit ac planorum, quæ transeunt per circulos CAF CEF ut per se patet (§.7), mensura verò horum planorum est ADE, ut constat ex Solidorum Geometria, angulus nempe factus in centro sphaeræ, sive arcus AE, liquet eundem arcum optimè constitui pro mensura anguli ACE. Si ergo arcus AE sit 90° , seu quadrans, anguli ad C sunt recti; si verò maior quadrante, angulus ACE est obtusus; si minor, acutus; eumque tot gradus continere dicimus, quot arcus AE; ita e contra. Quoties igitur arcum aliquem angulo æqualem esse dicimus, intelligendum est arcum hunc illius anguli esse mensuram, hoc est, arcum tot gradus continere quot angulus.*

COROLLARIUM I.

§. 20. *Si duo circuli ACBF CEF se intersecent, anguli versus eandem partem AFE ACE, vel EFB ECB æquales sunt; polis enim C & F descripto circulo BEA, arcus AE est mensura communis angulorum AFE ACE, itemque EB angulorum ECB EFB.*

COROLLARIUM II.

§. 21. *Per sinum, Tangentem, vel Secantem anguli Sphaerici cuiusculunque intelligi debet sinus, tan-*

tangens, & secans illius arcus, qui est mensura illius anguli. Idem dic de sinu secundo, tangente, & secante secundâ, sive arcus complementi.

COROLLARIUM III.

§. 22. Complementum anguli Sphærici cujuscunque est complementum ejus arcus, qui complementi illius anguli est mensura.

DEFINITIO VIII.

§. 23. *Triangulum Sphæricum* dicimus figuram illam, quæ a tribus arcibus AC AB BC circumorum maximorum in Sphæræ superficie comprehenditur. Licet vero triangula etiam sphærica sint quæ in superficie sphæræ ab arcibus circulorum minorum & majorum permixtim efformantur, priora tamen contemplationi solum nostræ subijcimus. Eadem divisio triangulorum æquæ in rectilineis ac in Sphæricis locum habet. Dicimus enim *Triangulum Sphæricum Equilaterum* illud quod a tribus arcibus æqualibus efformatur; *Isosceles*, quod a duobus æqualibus; *Scalenum*, quod a tribus inæqualibus. Ita etiam dicimus *triangulum Sphæricum rectangulum*, si in eo aliquis rectus angulus existat; *Acutangulum*, si tres anguli sint acuti, *Obtusangulum*, si aliquis angulus obtusus, nullus verò rectus; unoque verbo duo hæc genera triangulorum dicuntur *Obliquangula*. Arcus, qui recto angulo opponitur dicitur *hypotenusa*; reliqua duo, ut ab hoc distinguantur, dicuntur *latera*: ita ut in obliquangulis ubi nullus est rectus tres arcus dicuntur *latera*.

Fig. 29

CO-

COROLLARIUM.

Fig. 25 §. 24. Quivis arcus trianguli sphærici minor semicirculo esse debet. Quum enim duo arcus BA BC concurrant in B, si producantur concurrent etiam in altero puncto E, ita ut BAE BCE sint semicirculi (§. 5) item duo arcus AB AC concurrentes in puncto A producti concurrent iterum in puncto D, & arcus ABD ACD sunt semicirculi; ergo quilibet arcuum AB BC AC semicirculo minor est.

DEFINITIO IX.

§. 25. Quoniam triangulum sphæricum componitur tribus arcibus circularum tres angulos includentibus, illud, ad rectilineorum similitudinem, promiscuè sex partes habere dici potest, tres scilicet angulos & tres arcus.

In triangulo rectangulo, anguli recti nullâ habitâ ratione utpote cogniti, quinque tantum partes considerantur; quarum *partem mediam* illam dico, sive sit latus sive angulus, quæ inter duas alias consideratas tanquam extremis interjacet; hæc vero respectu mediæ dicuntur *partes conjunctæ*, & reliquæ duæ respectu ejusdem mediæ vocantur *partes disjunctæ*. Exemplo res dilucidabitur. Sit triangulum aliquod Sphæricum ABC rectangulum ad B, hoc angulo minimè considerato, erunt arcus AB BC AC & duo anguli A C reliquæ quinque partes;

Fig. 34 Si media $\left\{ \begin{array}{l} BC \\ CC \\ AC \\ A \\ AB \end{array} \right.$ sunt conjunctæ $\left\{ \begin{array}{l} C, AB, \\ CB, CA, \\ C, A \\ AC, AB \\ A, BC \end{array} \right.$ sunt disjunctæ $\left\{ \begin{array}{l} A, AC \\ A, AB \\ CB, AB \\ C, CB \\ C, AC \end{array} \right.$ si ergo una harum partium, puta hypotenusa AC, tanquam media consideretur, *partes duæ conjunctæ* erunt anguli duo C &

C & B, qui proximiores sunt huic mediæ parti AC, partes verò *disjunctæ* sunt duo latera AB CB, reliquæ nempe duæ partes. Similiter, si angulus C tanquam partem mediam considero, erunt partes *conjunctæ* latus CB & hypotenusa AC; & *disjunctæ* angulus A & latus AB. Si ponatur pars media latus AB, erunt partes *conjunctæ* angulus A & latus CB, de angulo enim recto B nulla habetur ratio, *disjunctæ* verò hypotenusa AC & angulus C; atque ita de singulis partibus ut in laterculo appposito observatur. Hæc definitio probè est concipienda, maximæ enim, ut deinceps videbimus, est utilitatis.

DEFINITIO X.

§. 26. Si duo vel plures anguli sint omnes vel recti, vel acuti, vel obtusi dicuntur esse *ejusdem speciei*; si verò unus sit acutus, alter rectus, vel obtusus, *diversæ speciei* dicuntur. Ita pariter si duo vel plures arcus sint omnes vel quadrantes, eo majores, vel minores, dicuntur *ejusdem speciei*; si verò comparatur quadrans cum arcu eo minore, vel majore, dicetur esse *diversæ speciei*: ita etiam si quadrantes comparentur cum angulis rectis, arcus quadrante minores cum angulis acutis, arcus demum quadrante majores cum obtusis dicuntur hi arcus esse *ejusdem speciei* cum angulis cum quibus comparantur; si secus, *diversæ*; & e contra.

PRO-

PROPOSITIO I.

Fig. 26

In omni triangulo Sphærico ABC duo latera,
puta AB BC , simul sumpta tertio
 AC sunt majora.

- §. 27. Ex arcu BC perficiatur circulus BE -
 El.l.3 Pr.25 FC^ , ducaturque diameter BDF ; abscindatur
 insuper arcus BE æqualis BA , ita ut arcus CBE
 sit summa duorum laterum CB BA ; ducantur
 insuper chordæ BE BA AC EC & recta AD .
 Hisce positis, quoniam triangula duo rectilinea
 BED BAD habent latus BE æquale BA ob
 æqualium arcuum quorum ex constr. sunt sub-
 tensæ, insuper latus BD comune, & angulos
 BDE BDA æquales ob æquales arcus BE BA ,
 erit etiam latus DE æquale lateri DA , hoc est,
 subtensa EC æquatur duobus lateribus AD DC
 simul sumptis in triangulo ADC ; sed duo la-
 tera AD DC simul sumpta sunt tertio AC ma-
 jora *, ergo etiam subtensa EC est major sub-
 tensa AC ; quamobrem, quum arcus cognomi-
 nes sint in eadem subtensarum ratione *, patet
 *El.l.3 Pr.26 27 arcum EBC sive duo latera AB BC simul sum-
 pta tertio CA esse majora. Q. e. d.

COROLLARIUM.

Fig. 25

§. 28. Ex hac propositione deducitur in omni
 triangulo sphærico ABC tria latera AB AC
 CB simul sumpta minora semper esse integrâ
 circuli peripheriâ: si enim latera duo quæcun-
 que AB AC producta intelligantur, convenient
 in D efformantes duos semicirculos ABD ACD
 (§. 5), ut igitur tria hæc latera AB AC CB
 simul sumpta integram conficerent circuli cir-
 cum-

circumferentiam, oporteret latus BC æquale esse debere duobus BD CD simul sumptis; sed demonstratum est BD DC simul sumpta tertio BC esse majora, ergo tres arcus AB AC CB necessario simul sumpti circuli circumferentia sunt minores.

PROPOSITIO II.

*In omni triangulo Sphærico ABC si duo latera, puta
BA BC sint æqualia, etiam anguli oppositi A Fig. 27
et C æquantur; et vicissim, si duo anguli
A et C sint æquales, latera opposita
BC BA etiam æquantur.*

§. 19. 1°. Sint duo latera BA BC æqualia, ex quibus abscindantur partes BD BE æquales, erunt etiam reliquæ DA EC æquales: considerentur per puncta A & E, item per C & D ducti arcus AnE CnD. Hisce positis si intelligamus triangulum CDB ita triangulo AEB supponi ut punctum E sub D cadat, latus verò BE sub BD, ob æquales BE BD punctum B sub ipsum B cadet, & ob angulum DBE utrique triangulo communem latus BC coincidat cum BA, quum verò duo hæc latera sint æqualia, punctum A sub C cadet, & arcus AnE sub CnD; ergo anguli duo EAB DCB, itemque duo AEC CDA, atque arcus AnE DnC sunt æquales; quoniam igitur in triangulis DCA EAC tales dentur arcus & anguli æquales, si triangulum DCA altero supponi concipiamus ita ut punctum E sub D, latus EC sub DA, cadet & A sub C, & arcus DnC sub AnE; ac proinde angulus DCA æquatur angulo EAC; quum verò etiam EAB æquetur DCB, erit totus BAC æqualis BCA. Q. e. 1°. d.

G

II°.

II^o. Sint duo anguli BAC BCA æquales. Abscindantur arcus AD CE æquales & per puncta A & E , item per C & D ducti intelligantur, ut prius, arcus CnD AnE . Concipiatur modò triangulum DCA supponi triangulo EAC ita ut punctum E sub D , arcus verò EC sub DA cadat, ob horum arcuum æqualitatem punctum C sub A cadet, & ob æqualitatem angulorum BAC BCA arcus AC coincidit cum eodem AC , punctumque C cum A , itemque arcus CnD cum AnE ; ergo anguli duo EAC DCA sunt æquales, & arcus CnD AnE , angulique CDA AEC ; ac per consequens etiam CDB AEB : quum igitur hæc dentur æqualia in triangulis CDB AEB si unum CDB altero supponi fingamus, ita ut punctum E sub D , latus verò DC sub EA cadet, ob æquales angulos AEB CDB itemque DCB EAB , latus DB coincidit cum latere EB , BC verò cum AB ; concurrunt itaque in puncto B , quare BC æquatur BA . Q. e. 2^o. d.

COROLLARIUM I.

§. 30. Ex quo infertur triangulum sphæricum quodcunque æquilaterum etiam æquiangulum esse: si enim ponatur tertium latus AC æquale lateri BA vel BC , etiam angulus oppositus B æquatur angulo A vel C . Ita vicissim omne triangulum sphæricum æquiangulum etiam æquilaterum est; ob angulum enim B æqualem angulo A vel C , etiam latus oppositum AC æquatur lateri AB vel CB .

COROLLARIUM II.

§. 31. Si trianguli isosceles vel æquilateri
ABC

ABC basis æqualiter dividatur in F, & per B & F ductus intelligatur arcus BF, hic perpendiculariter basi insisteret. Nam si triangulum BFC supponi altero BAF fingamus, ita ut punctum A sub C, latus verò CF sub AF cadat, quum anguli BAF BCF ex hyp. sint æquales, itemque arcus BA BC, coincidet etiam FB cum FC; ac per consequens angulus BFC æquatur BFA, hoc est, sunt recti (§.9).

COROLLARIUM III.

§.32. In omni triangulo sphærico ABC si duo latera AB BC simul sumpta sint æqualia semicirculo, tertium latus productum efficit angulum externum BCD æqualem interno A. Producantur enim duo latera AB AC usque dum concurrant in D, erit ABD semicirculus (§.5), sed duo arcus AB BC ex hyp. sunt æquales semicirculo, si igitur ab æqualibus dematur æqualis arcus AB, remanent duo arcus BD BC æquales: unde angulus BCD æquatur angulo BDC (§.29), sed BDC æquatur angulo A (§.20) ergo externus BCD est æqualis interno A. Itavicissim si in triangulo sphærico quocunque angulus externus BCD sit æqualis interno A, duo arcus BC BA simul sumpti constituunt semicirculum. Posito enim angulo BCD æquali angulo A, ponitur etiam æqualis D (§.20), unde BC æquatur BD (§.29), sed AB cum BD efficiunt semicirculum, ergo etiam AB cum BC æquantur semicirculo.

Fig. 25

PROPOSITIO III.

Fig. 25 In omni triangulo sphaerico ABC majori angulo C majus latus AB opponitur, minori B minus AC; & contra majori lateri AB major angulus C, minori AC minor B opponitur.

§. 33. I°. Quoniam C ex hyp. major B, sit angulus BCF æqualis B; quare erit CF æqualis FB (§. 29) & arcus FC simul cum AF æqualis AB, sed FC cum AF major AC, ergo AB major AC. Q. e. 1°. d.

II°. Angulus G aut æqualis, aut minor, aut major esse debet angulo B, sed æqualis non est, aliter AG AB essent æqualia (§. 29) contra hyp. neque est minor, nam latus BA oppositum minus esse deberet latere AG ex prima propositionis parte, ergo major necessariò erit. Q. e. 2°. d.

COROLLARIUM I.

§. 34. Ex his manifestum est in omni triangulo sphaerico ABC si duo latera AB BC simul sumpta sint semicirculo majora, externum BCD minorem esse interno A; si minora, externum BCD interno A majorem: productis enim duobus lateribus AC AB ita ut in D concurrant, fiet ABD semicirculus, & angulus D æqualis A (§. 20); si ergò AB & BC simul ponantur semicirculo majora, erit latus BC majus latere BD, hoc est, angulus BCD major angulo D, sive angulo A; si verò AB & BC simul sint semicirculo minora, erit BC minor BD, hoc est, angulus BCD major angulo D, major A.

CO.

COROLLARIUM II.

§. 35. Contrarium æquè patet : si enim ponatur externus BCD major, vel minor interno A, sive D, in primo casu erit BD major BC, in secundo minor; quare, quum BA & BD simul efficiant semicirculum, erunt in primo casu latera AB BC simul sumpta minora semicirculo, in secundo majora.

PROPOSITIO IV.

In omni triangulo spherico ABC si duo latera AB BC simul sumpta sint semicirculo æqualia, erunt, anguli ad basim A BCA simul sumpti duobus rectis æquales : e contra, si duo anguli ad basim A BCA sint simul sumpti duobus rectis æquales, latera BA BC erunt simul sumpta semicirculo æqualia. Fig. 25

§. 36. I°. Productis lateribus AB AC usque dum concurrant in D, quoniam AB cum BC positum est semicirculum conficere, erit externus angulus BCD æqualis interno A (§. 32) sed angulus externus BGD cum BCA sunt duobus rectis æquales (§. 9) ergo anguli ad basim BCA & A sunt duobus rectis æquales. Q. e. 1°. d.

II°. Positis verò angulis ad basim BCA & A duobus rectis æqualibus, erit internus A æqualis externo BCD (§. 9) ergo duo latera AB BC simul sumpta æquantur semicirculo. Q. e. 2°. d.

COROLLARIUM.

Fig. 27 §. 37. Ex prima propositionis parte inferitur necessarium in omni triangulo isoscele sphærico, si duo latera AB BC sint quadrantes, angulum quemlibet A vel C ad basim rectum esse; quum enim AB cum BC conficiant semicirculum, erunt duo anguli simul sumpti A & C duobus rectis æquales, sed AB æquatur BC , ergo angulus A æquabitur angulo C (§. 29) erit proinde uterque rectus: si ulterius basis AC sit quadrans ex iisdem principiis patet, triangulum hoc æquilaterum tres rectos angulos continere. Ex secunda propositionis parte vicissim demonstratur, si uterque angulorum A & C sit rectus, latera duo AB & BC necessarium quadrantes esse debere; nam simul sumpta semicirculum conficere debent & æqualia esse inter se, quod fieri non posse, nisi quodlibet latus sit quadrans, manifestum est; si ergo in triangulo æquiangulo tres dentur recti, erit quodlibet latus quadrans.

PROPOSITIO V.

Fig. 25 In omni triangulo sphærico ABC si duo latera AB AC sint simul sumpta semicirculo majora, erunt pariter anguli ad basim B & BCA simul sumpti duobus rectis majores; si verò minora, anguli erunt duobus rectis minores: & vicissim si duo anguli ad basim B & BCA sint duobus rectis majores, erunt latera AB AC simul sumpta semicirculo majora; si verò minores, erunt latera semicirculo minora.

§. 38. I°. Si latera AB AC simul sumpta ponantur semicirculo majora, angulus externus

nus BCD erit minor interno A, si verò minor, erit externus BCD major interno A (§. 34) sed in utroque casu duo anguli BCD BCA sunt duobus rectis æquales (§. 9) ergo in primo casu erunt duo anguli BCA & A simul sumpti duobus rectis majores, in secundo minores. Q. e. 1^o. d.

II^o. Supponantur modò duo anguli B & BCA duobus rectis majores, si ve minores; quum in utroque casu anguli duo BCA & BCD sint duobus rectis æquales (§. 9) erit in primo casu externus BCD minor interno A, in secundo major; ergò in primo casu duo latera AB AC simul sumpta sunt semicirculo majora, in secundo minora. Q. e. 2^o. d.

COROLLARIUM I.

§. 39. Clarè liquet ex prima propositionis parte in omni triangulo sphærico isoscele si duorum laterum æqualium AB BC utrumque sit quadrante majus, vel minus, angulos ad basim obtusos esse, vel acutos; in utroque enim casu duo latera AB BC sunt æqualia, at in primo hæc duo simul sunt semicirculo majora, in secundo minora; ergo in primo casu duo anguli A & C necessariò debent esse obtusi, in secundo acuti. Quod si insuper basis AC æqualis BA vel BC ponatur, hoc est in primo casu major quadrante, in secundo minor, triangulum hoc æquilaterum tres æquales angulos continebit obtusos, vel acutos, prouti quilibet latus majus, vel minus quadrante existit. Ex secunda vero propositionis parte colligitur vicissim, si in triangulo isoscele ABC duo anguli ad basim sint obtusi, vel acuti, latera opposita esse quadrante majora, vel minora; quare si angulus ad verti-

Fig. 27

cem A etiam obtusus, vel acutus ponatur & uno reliquorum æqualis, triangulum æquiangulum habebit in primo casu tria latera quadrante majora, in secundo minora.

COROLLARIUM II.

Fig. 28. 29 §. 40. In triangulo isoscele, in quo duo latera AC CB sunt quadrante majora, si basis quadrans vel quadrante major sit, & reliquis inæquale, angulus ad vertice C erit etiam obtusus: in utroque enim casu facto polo in A quadrantis intervallo describatur arcus EDF, qui in casu baseos AB quadrante majoris abscindet arcus AF AD æquales (*fig. 28*), in casu verò baseos AB quadranti æqualis, abscindet AD æqualem basi (*fig. 29*) sed in utroque casu angulus ad D est rectus (§. 37) & producto latere BC usque dum conveniat cum FD in E, erit arcus FD (*fig. 28*) & BD (*fig. 29*) mensura anguli obtusi A (§. 19) quilibet igitur quadrante est major, unde DE quadrante minor (§. 5) ut etiam arcus CE, posuimus enim latus CB quadrante majus; quum ergo CE ED simul sumpti sint semicirculo minores, erit angulus externus EDA major interno ECD, sed EDA est rectus, ergò ECD acutus, ac proinde ACB obtusus.

COROLLARIUM III.

§. 41. Quod si triangulum fuerit scalenum, & latera AC CB quadrante majora, basis verò vel quadrans (*fig. 29*) vel quadrante major (*fig. 28*) etiam in hoc casu omnes anguli erunt obtusi. Sit enim primum latus BA quadrans, & latus CB majus AC, abscindatur arcus CP æqualis AC, ducaturque AP; item quadrantis AB interval-

Fig. 28. 29

fo facto polo, in A describatur arcus BD; patet posita hac constructione angulum ABD rectum esse; ac proinde ABC obtusum: similiter quum AC quadrante majus æquetur lateri CP, erit angulus CAP obtusus (§. 39), & multo magis CAB: in triangulo demum CAP isoscele, quum etiam basis AP utpote major AB sit quadrante major, angulus ad verticem A erit obtusus per præc. Corol. Simili ratiocinio prorsus demonstratur in triangulo ABC in quo basis AB quadrante major, & latus CB majus AC, omnes angulos esse obtusos, postquam facto polo in A abscindantur quadrantes AF AD ductis arcibus FD, & AP.

Fig. 28

PROPOSITIO VI.

In omni triangulo sphaerico ABC tres anguli sumpti sex rectis sunt semper minores, duobus tamen majores.

Fig. 29

§. 42. I°. Producantur latera duo AB & AC in D & R: erunt anguli tres ABC ACB BAC cum tribus aliis ex alia parte CBD BCD BAR simul æquales sex rectis, ergo primi tres simul sunt iidem sex rectis minores Q. e. 1°. d.

II°. Duo anguli BAC BCA simul sumpti aut duobus rectis sunt majores, aut æquales, aut minores; in primo & secundo casu manifesta est propositio; addito enim iis angulo ABC, semper tres anguli sunt duobus rectis majores: in ultimo autem casu tres hos angulos etiam duobus rectis esse majores ita demonstratur. Quoniam BAC BCA simul sumptos duobus rectis minores supponimus, erunt latera duo BA BC simul sumpta semicirculo minora (§. 38), ac proinde angulus externus BCD major interno

no BAC (§. 24); supponatur ex C ductus arcus CP, ita ut efficiat angulum PCD æqualem PAC five PDC; erunt juxta hanc suppositionem latera duo AP PC simul sumpta semicirculo æqualia (§. 32), ac per consequens duo latera PB PC simul sumpta illo sunt minora; unde anguli duo PCB PBC simul sumpti sunt duobus rectis minores (§. 34); sed duo CBP CBA sunt simul duobus rectis æquales (§. 9) ergò angulus CBA est major BCP, & duo anguli CAB CBA simul sunt majores duobus DCP ICB, hoc est uno DCB; sed DCB cum BCA sunt duobus rectis æquales; ergo tres BAC ABC BCA sunt duobus rectis majores. Q. e. 2°. d.

PROPOSITIO VII.

Fig. 30

In omni triangulo sphærico rectangulo ABC anguli sequuntur speciem laterum oppositorum; atque ita vicissim latera sequuntur speciem angulorum oppositorum.

§. 43. I°. Habeat triangulum ABC ad A rectangulum latus AC quadrans, erit C polus circuli cujus arcus AB (§. 17), ergò CB est quadrans (§. 14), & perpendiculariter ad AB insistit (§. 18); si igitur fiat AE arcus quadrante minor, & AD quadrante major, cadet arcus BE inter A & C, & BD in AC producto; ac per consequens lateri AE opponitur acutus angulus ABE, lateri AC quadranti angulus rectus ABC; lateri demum AD, angulus obtusus ABD. Q. e. 1°. d.

II°. Habeat triangulum ABC rectangulum ad A etiam angulum ad B rectum, erunt duo latera AC BC æqualia (§. 29) & simul sumpta semicirculo æqualia (§. 36), quare sunt quadrantes

tes; arcus igitur ductus BE inter A & C abscindet angulum ABE acutum; cui correspondet latus AE quadrante minus; arcus verò BD ultra C ductus dat angulum ABD obtusum, cui correspondet arcus AD quadrante majus. Q. a. 3^o. d.

COROLLARIUM.

§. 44. Si ergo in rectangulo sphærico latus aliquod ponatur quadrans, etiam hypotenusa quadrans est, vicissim verò si ponatur quadrans hypotenusa, aut unum aut ambo latera sunt quadrantes.

PROPOSITIO VIII.

Si in arcu semicirculi CEHA, qui per polum H alterius AEDC transit, punctum eligatur B a polo H tamen diversum, eoque quotvis arcus ducantur FD EGE BF &c. ad circumferentiam inferioris circuli AEDC, arcuum tali pacto ductorum erit semper maximus BHA, minimus BC, qui per polum H transit; reliquorum semper is est major, qui minus a maximo BHA distat. Fig. 311

§. 45. Sit diameter AC communis circulis AEC & AHC; ex puncto B ducantur chordæ BA BF BE BD EC, ex eodem puncto B demittatur in diametrum perpendicularis BG, & connectantur puncta F & G; E & G; D & G. Erunt anguli BGA BGF BGE BGD BGC recti: recta verò GA est major GF, hæc major GE, hæc major GD, hæc demum major GC*, in eadem quæque ratione sunt illarum quadrata, ac proinde si hisce quæ *El.J. 3 Pr. 7
dra-

drata, ac proinde si hisce quadratis addatur æquale quadratum perpendiculi BG, erit quadratum AG cum quadrato GB, hoc est, quadratum AB* *El.1.1 Pr. 47* majus quadrato FG cum quadrato GB, sive quadrato BF; eodem ratiocinio patet quadratum BF majus esse quadrato BE, hoc majus quadrato BD, hoc demum majus quadrato BC; sed quadrata sunt in eadem laterum ratione, ergo BA majus BF, BF majus BE, BE majus BD, BD majus BC; at rectæ hæ sunt subtensæ arcuum cognominum ex hyp. ergo arcus hi sunt in eadem subtensarum ratione*; ac proinde arcus BA major arcu BF, hic major BE, hic major BD, hic demum major BC. Q.e.d. *El.1.3 Pr. 26*
27 Cor. ex Wi.
figura,

G O R O L L A R I U M.

§. 45. Quum igitur arcus quotcunque ducti a puncto B semper efficiant angulos BDC BEG, BFC acutos, ob latus BC quadrante minus (§.43) manifestum est ex dato puncto in superficie spheræ extra polum H unicum tantum duci posse circulum CBHA, qui transiens per polos circuli alterius dati AEDC, huic sit perpendicularis; & arcum BC, qui quadrante minor est, ex parte anguli acuti BDC eadere, contra arcum quadrante majorem BHA ex parte anguli obtusi BDA in puncto A diametraliter priori C opposito.

PROPOSITIO IX.

*In omni triangulo sphaerico rectangulo in quo nullum
latus sit quadrans, si duo latera sint ejusdem spe-
ciei, erit hypotenusâ quadrante minor; si diversæ,
hæc erit quadrante major: & vicissim, si hypothe-
nusa sit quadrante minor, erunt duo latera ejus-
dem speciei; si major diversæ.* Fig. 31

§. 47. I°. Sit triangulum Sphaericum BCD
rectangulum in C, cujus duo latera CB CD sint
quadrante minora; producto latere CD in E
ita ut CE sit quadrans, erit punctum E polus
circuli CBHA (§. 17 14), unde etiam EB est
quadrans; sed ex prop. præc. BD minor BE,
ergo hypotenusâ minor quadrante. Eodem
modo patet in triangulo BAD rectangulo ad A,
quorum duo latera AB DA sunt quadrante ma-
jora, hypotenusam BD quadrante EB esse mi-
norem. Quod si ponatur in triangulo CBF la-
tus unum CB quadrante minus, reliquum ve-
rò CF quadrante majus manifestum est, hypo-
thenusam FB quadrante EB majorem esse. Q. e.
1°. d.

II°. Ponatur modo in prædicto triangulo hy-
pothenusam DB esse quadrante minorem, erunt
latera DC BC, vel AB DA ejusdem speciei,
aliter enim ex prima parte hypotenusâ foret qua-
drante major contra hypot. Ita similiter in trian-
gulo CBF positâ hypotenusâ BF quadrante
majore, latera CB CF necessariò diversæ speciei
esse debent, aliter, ex prima parte esset hypo-
thenusâ quadrante minor contra hyp. Q. e. 2°. d.

COROLLARIUM.

§. 48. Quum (§. 43) demonstratum sit in triangulo sphærico rectangulo angulos sequi speciem laterum oppositorum, & vicissim, infertur, si in illo anguli obliqui ejusdem sint speciei, hypotenusam esse quadrante minorem; si diversæ hypotenusam esse quadrante majorem; & vicissim si hypotenusa sit quadrante minor, angulos obliquos ejusdem esse speciei; si major diversæ.

PROPOSITIO X.

Fig. 30 a

In omni triangulo sphærico obliquangulo ABC si anguli ad basim CAB BCA sint ejusdem speciei, arcus BE perpendiculariter ex angulo B in basim ductus, cadet intra; si diversæ speciei, cadet extra triangulum; *Q. e. c. contra.*

Fig. 30

§. 49. I°. Ponantur anguli CAB BCA ambo obtusi; si igitur perpendicularum cadit extra triangulum in D, erit in triangulo BAD ad D rectangulo latus BD, quod obtuso angulo A opponitur, majus quadrante (§. 43), ergo etiam in triangulo CBD rectangulo ad D angulus BCD est obtusus (§. 43) sed BCA etiam positus est obtusus, ergo CB cum arcu ACD efficit duos obtusos, quod quum absurdum sit (§. 9.) patet perpendicularum non extra sed intra triangulum cadere. Eodem modo demonstratur propositio si duo anguli A & BCA supponantur acuti; si enim in hoc casu perpendicularum caderet extra triangulum, arcus CB cum ACD efficeret angulos BCA BCD ambos acutos, contra (§. 9.) *Q. e. I. d.*

II°.

II°. Quod si angulus unus A ponatur acutus, alter verò BCA obtusus, in hoc casu perpendicularum extra triangulum cadere debet; si enim intus cadetet, puta in D, jam in hoc casu efficeret duotriangula BDA CDB rectangula in D, unde quum in hac suppositione perpendicularum BD eodem tempore opponatur angulo acuto A, & obtuso BCA, sequeretur esse eodem tempore majus & minus quadrante (§. 43) quod quum absurdum sit, patet illud extra triangulum cadere debere. Q. e. d.

Conversa propositionis eodem modo patet.

COROLLARIUM.

§. 50. Liqueat (§. 46), si basis AC producaturs versus partem anguli acuti exterioris BCE, perpendicularum esse quadrante minus; si verò ex parte anguli obtusi exterioris in A, esse quadrante majus, & quidem prioris BE complementum ad semicirculum.

SCHOLIUM.

§. 51. *Propositio hac etiam vera est si triangulum sit rectangulum in vertice B; quod si etiam anguli ad basim recti supponantur, perpendicularum tam extra triangulum, quam intra cadere potest; in vertice enim B est polus.*

CAPUT II.

De triangulorum Sphæricorum Resolutione.

PROPOSITIO I.

Fig. 33 In omni triangulo sphærico ABC rectangulo ad A
 sinus totus est ad sinum hypotenuse BC, ut
 sinus anguli alterutrius C vel B ad sinum
 lateris oppositi BA vel CA.

§. 52. **S**upponamus primò latus utrumque esse quadrante minus, erit etiam hypotenusa CB quadrante minor (§. 47); producantur latera duo GA AB, ita ut CAD ABN sint quadrantes; quoniam angulus ad A supponitur rectus, erit N polus circuli CAD (§. 17) proinde circulus NEDQ per N & D ductus est in D perpendicularis circulo MCAD (§. 18); C ergò est illius circuli polus (§. 17), & producti hypotenuse CB, erit CBE quadrans (§. 14), & arcus ED mensura anguli BCA (§. 19). Hisce positis ducantur sphære radii FD FA FC, in quos ex punctis E & B perpendiculares demittantur EG BH, item EF BK; erit proinde FE sinus totus sive radius, EG sinus arcus ED, BK sinus hypotenuse BG, BH denique sinus arcus BA; sed triacula duo rectilinea EFG BKH sunt similia, nam præter rectos ad G & H habent angulos EFG BKH æquales, rectæ enim BK EF sunt in eodem plano circuli CBEO; ergo erit EF sinus totus ad BK sinum hypotenuse, ita EG sinus anguli C ad BH sinum lateris oppositi BA; eadem est demonstratio respectu alterius anguli obliqui B.

Po.

Ponatur secundò triangulum OBA ad A rectangulum, in quo latus unum OD sit quadrante majus, erit in hac hypothefi etiam hypothenuſa quadrante major (§. 47); abſcindantur quadrantes OE OD, cæteraque fac ut prius; ob triangula ſimilia EFG BKH erit FE ad BK ut EG ad BH; ſed FE eſt ſinus totus, BK eſt ſinus arcus BEO, qui prioris BC eſt complementum ad ſemicirculum, EG ſinus arcus ED, hoc eſt (quoniam illius eſt meſura) anguli O; BH denique ſinus lateris BA, ergò etiam in hoc caſu ſinus totus FE eſt ad ſinum hypothenuſæ BK, ut ſinus EG anguli O ad ſinum BH lateris oppoſiti BA.

Ponatur tertio triangulum aliquod BOE ad Q rectangulum, in quo duo latera QAB QDE ſint quadrante majora, erit hypothenuſa BE quadrante minor: productis igitur lateribus QAB QDE uſque dum concurrant in E, novum triangulum BNE ad E rectangulum eſt formabitur, in quo duo latera BN EN ſunt quadrante minora; ſed tam lateris NB quam lateris BAQ, tam NE quam EDQ; angulorum verò tam NEB quam BEQ, tam NBE quam EBQ idem eſt ſinus; ergò quum in hoc triangulo NBE ſinus totus ſit ad ſinum hypothenuſæ BE, ut ſinus alterutrius laterum NB vel NE ad ſinum anguli oppoſiti NEB vel NBE ut prius demonſtravimus, erit etiam in altero triangulo BQE idem ſinus totus ad ſinum ejuſdem hypothenuſæ BE, ut ſinus lateris BAQ vel QDE ad ſinum anguli oppoſiti BEQ vel EBQ.

Quod ſi latus unum ponatur quadrans, ſtatim propoſitio ſit etiam manifeſta. Q. e. d.

COROLLARIUM.

Fig. 33 §. 53. Ex hac propositione infertur in omni triangulo sphærico tam rectangulo quam obli-
 quangulo sinus laterum esse in eadem ratione,
 ac sinus angulorum iis oppositorum; est enim
 in rectangulo ABC sinus totus ad sinum hypo-
 thenusæ BC, ut sinus anguli C ad sinum late-
 ris oppositi BA, & ut idem sinus totus ad eun-
 dem sinum hypotenusæ BC ita sinus anguli B
 ad sinum lateris oppositi AC, ergo erit etiam
 sinus anguli C ad sinum lateris AB, ut sinus
 anguli B ad sinum lateris AC. Idem demon-
 stratur si triangulum ABC fuerit obliquangu-
 lum, in eo enim perpendicularum BE aut intra
 triangulum ut in fig. 30, aut extra cadet ut in
 fig. 32, in utroque autem casu semper est in re-
 ctangulo ABE sinus totus ad sinum hypothe-
 nusæ BA, ut sinus anguli A ad sinum lateris
 oppositi BE; & in alio rectangulo BEC sinus
 totus ad sinum hypotenusæ BC, ut sinus an-
 guli C ad sinum lateris BE; ergo ex notâ
 proportionalium doctrinâ sinus anguli A ad si-
 num anguli C, ut sinus lateris CB ad sinum la-
 teris AB.

PROPOSITIO II.

Fig. 33 In omni triangulo sphærico ABC rectangulo ad A
 sinus totus est ad sinum alterutrius laterum CA
 vel BA, ut tangens anguli C vel B ab
 hypotenusæ & latere hoc intercepti
 ad tangentem lateris huic an-
 gulo oppositi BA vel CA.

§. 54. Supponamus primò latera duo CA BA
 qua-

quadrante minora, erit etiam hypothenusa CB quadrante minor; producantur GA CB ut que dum CAD CBE sint quadrantes; cætera fiant ut in præc. prop. Ex puncto A & D eleventur perpendiculares AS DL ad radios FA FD, & ad planum circuli CADO, quæ terminentur a secantibus FEL, FBS ductis per centrum F & puncta E B. Quare arcus DE sive anguli DCE tangens est DL, arcus verò BA tangens AS: ex puncto A in radium FC demittatur perpendicularis AP. Quoniam punctum S est in plano circuli GBEO producto, recta PS ducta per puncta S & P in eodem est plano, sed, ob inclinationem plani circuli GBEO in quo sunt rectæ LF SP ad planum circuli CADO in quo sunt rectæ AP DF, angulus LFD æquatur angulo SPA, ut ex Geom. Solid. constat; ergo triangula duo rectilinea DLF APS ad D & A rectangula sunt similia; ac proinde DF est ad AP, ut DL ad AS; hoc est sinus totus FD est ad sinum AP lateris unius AC, ut tangens DL anguli C ab hoc latere & hypothenusa comprehensi, ad tangentem AS lateris AB angulo C oppositi. Eadem est demonstratio respectu anguli B & lateris oppositi CA.

Sit secundò triangulum ORA ad A rectangulum in quo latus unum ADO sit quadrante majus, erit etiam hypothenusa BEO quadrante major; abscindantur igitur quadrantes OE OD; cæteraque fac ut antea: erit etiam in hoc casu FD ad AP ut DL ad AS ob similia triangula APS DFL; hoc est sinus totus FD ad AP sinum lateris ADO, quod prioris AC est complementum ad semicirculum, ita tangens DL anguli DOB ad tangentem AS lateris AB angulo huic oppositi.

Ponatur tertio triangulum BQE ad Q rectan-

H 2

gu.

gulum, in quo duo latera QAB QDE sunt quadrante majora, erit hypotenusa BE quadrante minor: quare productis lateribus QAB QDE usque dum concurrant in N , novum triangulum BNE ad N rectangulum efformabitur, in quo duo latera NB NE sunt quadrante minora: sed tam lateris NB quam lateris BAQ , tam lateris NE quam EUQ ; angulorum vero tam NEB quam QEB : tam NBE quam QBE idem est sinus, ergo, quum in hoc triangulo NBE , ut prius demonstravimus, sinus totus sit ad sinum lateris unius, puta NB , ut tangens anguli NBE inter hoc latus & hypotenusam comprehensi, ad tangentem lateris NE angulo huic oppositi, erit etiam in altero triangulo EQE idem sinus totus ad sinum lateris QAB , ut tangens anguli QBE ad tangentem lateris huic angulo oppositi QDE .

Quod si latus unum ponatur quadrans per se manifesta est propositio. $Q. e. d.$

COROLLARIUM.

§. 55. Quoniam cotangens anguli C vel B est ad sinum totum, ut sinus totus ad tangentem ejusdem anguli (§ 33 lib. 1) & sinus totus est ad tangentem anguli C vel B ut sinus lateris AC vel AB ad tangentem lateris oppositi BA vel CA ut demonstratum est, erit etiam ex æquo cotangens anguli C vel B ad sinum totum, ut sinus lateris AC vel AB adjacentis ad tangentem lateris oppositi BA vel CA ; sive invertendo, sinus totus ad cotangentem anguli C vel B , ut tangens lateris oppositi BA vel CA ad sinum lateris adjacentis CA vel BA .

PRO.

PROPOSITIO III.

In omni triangulo sphærico rectangulo ABC in quo nullum latus est quadrans si complementa BN AD ad quadrantem, positis lateribus CA AB quadrante minoribus, vel excessus supra quadrantem, iisdem positis quadrante maioribus, sumantur tanquam latera ipsa, semper erit sinus totus ad sinum alterutrius partium sejunctarum, ut sinus partis alterius sejunctæ ad cosinum partis mediæ. Fig. 33

§. 36. Ut veritas propositionis hujus fiat evidentiore per omnes quinque casus per quos quælibet pars trianguli, tanquam media considerari potest, excepto angulo recto (§. 25) eam demonstrare necesse est, ut nisi brevitati claritati tamen consulatur in re alias non nimis facili. Sit ergo in triangulo BCA, in quo duo latera CA AB sunt quadrante minora

I°. Latus AB pars mediæ; erunt partes disjunctæ hypotenusa BC & angulus C (§. 25), sed sinus totus est ad sinum hypotenuse BC ut sinus anguli C ad sinum lateris oppositi BA (§. 32) sinus verò lateris BA idem est ac cosinus complementi BN ad quadrantem; ergo, assumpto complemento BN pro ipsa latere AB, est sinus totus ad sinum partis disjunctæ BC, ut sinus partis alterius disjunctæ, hoc est, anguli C, ad cosinum partis mediæ AB.

II°. Sit modo AC pars mediæ; eadem est demonstratio; nam in hoc casu partes disjunctæ sunt hypotenusa CB & angulus B, ac proinde sinus totus est ad sinum hypotenuse BC, hoc est, partis unius disjunctæ, ut sinus anguli B, sive alterius partis disjunctæ ad cosinum partis

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mediæ AB, considerato complemento ad quadrantem BN tanquam latere ipso AB.

III^o. Ponatur modo hypotenusa BC pars media, erunt partes disjunctæ latera CA BA; productis igitur hisce lateribus CA BA & hypotenusâ CB usque dum CAD ABN CBE sint quadrantes, & ducto circulo DEN, novum provenit triangulum BNE ad E rectangulum (§. 18) in quo est sinus totus ad sinum hypotenusæ NB, ut sinus anguli N ad sinum lateris oppositi BE, hoc est, in triangulo BCA ponendo BN pro BA, sinus totus est ad sinum partis disjunctæ AB, ut sinus alterius partis disjunctæ AC, (ponimus enim AD pro AC quum AD æquetur angulo N), ad cosinum partis mediæ BC, sinus enim arcus BE est cosinus respectu arcus BC.

IV^o. Sit modo angulus C pars media, erunt partes disjunctæ angulus B & latus BA; lateribus vero CA AB cum hypotenusâ CB productis ut antea, erit in triangulo BNE sinus totus ad sinum hypotenusæ BN, ut sinus anguli NBE ad sinum lateris oppositi NE (§. 53), hoc est, ponendo BN pro BA, in triangulo BCA, sinus totus est ad sinum partis disjunctæ AB, ut sinus alterius partis disjunctæ, nempe anguli CBA cui ad verticem æquatur NBE, ad cosinum partis mediæ C; anguli hujus enim cosinus idem est ac cosinus arcus ED, hoc est, sinus arcus EN, qui prioris est complementum ad quadrantem.

V^o. Sit denique angulus B pars media, erunt partes disjunctæ angulus C & latus CA; productis igitur lateribus & hypotenusâ usque dum sint quadrantes versus partem R & M, & per horum extremitates ducto circulo novum efformabitur triangulum, in quo eodem ratiocinio

casus præcedentis idem eruitur. Q. e. d. 119

S C H O L I O N.

§. 57. Penſitatis hiſce quinque caſibus in ſphærico triangulo in quo duo latera ſuppoſita ſunt quadrante minora, reliquum eſſet idem præſtare in hypotheſi trianguli, in quo latus unum ſit quadrante majus, & in quo ambo ſunt quadrante majora; quum verò hoc nimium prolixitatis requirat in re alias ex dictis facili, & fundamento innixà ſinum, qui in arcubus quadrante minoribus ſunt iidem ac in illorum complementis ad ſemicirculum ut diximus (§. 7 lib. 1), expenſionem ſingulorum horum caſuum tyronum contemplationi relinquimus, unicum tantum addendo claritatis ergo. Sit triangulum BQE reſtangulum ad Q , in quo duo latera QAB QDE ſunt quadrante majora, ſitque latus QAB pars media, erunt partes diſjunctæ hypothenuſa BE & angulus BEQ : producantur ambo latera QAB QDE uſque dum convēniant in N , novum efformabitur triangulum ad N reſtangulum, in quo ob latera duo NB NE quadrante minora eſt ſinus totus ad ſinum partis diſjunctæ BE , ut ſinus alterius partis diſjunctæ anguli ſcilicet NEB , ad coſinum partis mediæ NB , ſumpto BA pro RN ; ergo etiam in triangulo BCE , quum ſinus anguli NER ſit idem ac ſinus anguli BEQ , ſinus verò lateris NB idem ac ſinus arcus BAQ , ſumpto arcu BA exceſſu nempe ſupra quadrantem QA pro ipſo latere QAB , erit ſinus totus ad ſinum partis diſjunctæ BE , ut ſinus alterius partis diſjunctæ, anguli nempe BEQ , ad coſinum partis mediæ QAB .

PROPOSITIO IV.

Fig. 33 In omni triangulo sphaerico rectangulo ABC in quo nullum latus est quadrans, si complementa ad quadrantem BN AD positis lateribus CA AB quadrante minoribus, vel excessus supra quadrantem, iisdem positis quadrante maioribus, sumantur tanquam latera ipsa, semper erit sinus totus ad cotangentem alterutrius partis conjunctæ, ut cotangens alterius partis conjunctæ, ad cosinum partis mediæ.

§. 58. Propositionem hanc similiter ut in præcedenti factum est, per omnes quinque casus examinabimus, per quos quælibet pars trianguli tanquam media considerari potest. Sit igitur in triangulo CBA cujus duo latera CA BA sunt ambo quadrante minora

I°. Latus AB pars mediæ; erunt partes conjunctæ latus AC & angulus B, sed sinus totus est ad cotangentem anguli B ut tangens lateris oppositi CA ad sinum lateris adjacentis AB (§. 55) ergo si BN AD complementa sumantur tanquam ipsa latera AB AC quum cosinus arcus BN idem sit ac sinus arcus BA, cotangens verò arcus AD eadem ac tangens arcus AC, erit sinus totus ad cotangentem partis unius conjunctæ anguli nempe B, ut cotangens alterius partis conjunctæ AC ad cosinum mediæ AB.

II°. Sit latus AC pars mediæ; erunt partes conjunctæ latus AB & angulus C; eadem est demonstratio; nam sinus totus est ad cotangentem anguli C partis nempe unius conjunctæ, ut tangens lateris oppositi BA, hoc est (considerato BN pro BA), ut cotangens alterius partis

conq

conjunctæ BA, ad sinum lateris adjacentis AC, sive (considerato AD pro AC), ad cosinum partis mediæ AC.

III°. Ponatur hypotenusæ BC pars media: erunt partes conjunctæ anguli duo B & C; productis lateribus CA AB & hypotenusæ CB, prouti sæpius diximus, in novo triangulo NBE ad E rectangulo erit sinus totus ad cotangentem anguli NBE, ut tangens lateris oppositi NE ad sinum lateris adjacentis BE (§. 55) ac proinde, quum anguli ad verticem NBE CBA sint æquales, tangens lateris NE eadem sit ac cotangens arcus DE sive anguli C, sinus verò lateris BE idem ac cosinus hypotenusæ CB; patet etiam in triangulo CAB sinum totum esse ad cotangentem partis unius conjunctæ sive anguli B, ut cotangens alterius partis conjunctæ sive anguli C, ad cosinum partis mediæ CB.

IV°. Fiat modò angulus C pars media; erunt conjunctæ duo arcus CB CA; & productis ut antea lateribus & hypotenusæ, in novo triangulo BNE est ut sinus totus ad cotangentem anguli N ita tangens lateris BE ad sinum lateris NE, sed sinus NE idem est ac cosinus DE sive anguli C, tangens arcus BE eadem ac cotangens BC, cotangens denique anguli N eadem ac cotangens arcus AD, sumpto igitur AD pro AC, erit etiam in triangulo CBA sinus totus ad cotangentem partis unius conjunctæ AC, ut cotangens partis alterius conjunctæ BC ad cosinum partis mediæ C.

V°. Sit tandem angulus B pars media: erunt conjunctæ BC CA, unde casus hic est idem cum præcedenti; productis scilicet lateribus & hypotenusæ versus partem R & M usque dum sint quadrantes, & ducto circulo per horum

rum

rum extremitates, novum efformabitur triangulum rectangulum, in quo idem eruitur ut in precedenti ratiocinio. Q. e. d.

S C H O L I O N I.

§. 59. Considerationem reliquorum casum in triangulo rectangulo in quo unum vel ambo latera sunt quadrante majora, consulto omittimus, unico tantum contenti, ne nauscam Tyronibus moveamus. Sis triangulum EBQ rectangulum ad Q , in quo duo latera QAB QDE sunt quadrante majora, sitque latus QAB pars media, erunt partes conjunctæ angulus BQE , & latus QDE : producantur latera usque dum concurrant in N , novum efformabitur triangulum ad N rectangulum habens latera duo quadrante minora: erit ergo, posita BN parte mediâ, sinus totus ad cotangentem partis unius conjunctæ, anguli nempe NBE , ut cotangens partis alterius conjunctæ NE , posito DB pro NE , ad cosinum partis mediæ NB ; sed anguli duo NBE QBE eandem habent cotangentem, arcus similiter NE QDE eandem habent cotangentem, (sumpto DE excessu nempe supra quadrantem lateris QDE pro ipso latere QDE), arcus etiam NB QAD eundem habent cosinum; ergo in triangulo QBE sinus totus ad cotangentem partis unius conjunctæ, anguli nempe QBE , ut cotangens partis alterius conjunctæ QDE ad cosinum partis mediæ QAB .

S C H O L I O N II.

§. 60. Nullus dubito quin propositiones hæc ultimæ primo obtutu tyronibus negotium aliquod facessans, quum aliqualem animi attentionem requirere videantur, sciant tamen nullam breviorem aut faciliorem methodum expositâ hæcenus inventam

tam esse, quàm absque secantium canone casibus omnibus fere trianguli sphaerici resolvendis satisfaciat, ut hujus naturae tractatus evolventibus probè manifestum est. Eam quidem Nepero debemus inventam, Wolfio verò perfectam, neque inde minorem ille laudem consequutus est, quam per inventionem applicationis logarithmorum ad Trigonometriam: regula enim unica infertur generalis claritatis: regula duabus ultimis propositionibus complexa, quàm semel memoriae mandata, summâ facilitate casus omnes fere nedum triangulorum sphaericorum, verum etiam rectilineorum resolvuntur: Regula autem hac est; rectangulum ex sinu toto in cosinum partis mediae in omni casu aequatur rectangulo ex sinubus disjunctarum, & rectangulo ex cotangentibus conjunctarum, sumptis complementis vel excessibus pro ipsis lateribus in sphaericis; & sinubus & tangentibus laterum pro lateribus ipsis in rectilineis triangulis. Restat modo ut excellentis hujus regulae applicationem videamus in sphaericorum triangulorum casibus, per quos partes notae cum quaesitis combinari possunt, qui omnes casus quoad rectangula triangula, Problematis sex sequentibus comprehenduntur. Antequam verò ulterius progrediamur, notent velim tyrones in regula non nisi de rectangulis agi, in quibus latus nullum est quadrans; si enim aliquod latus quadrans esset nec ullâ aliâ regulâ, nec ulteriori explicatione opus foret, quum ex sphaericis affectionibus supra explicatis abundè manifesta fiat resolutio. Ex gr sit triangulum $\triangle ABC$ ad A rectangulum, & in eo latus unum, puta AC , detur quadrans; necessariò hypotenusâ quadrans esse debet (§.44), angulus ergò ad B rectus (§.18), angulique C mensura est arcus FA : si e contra hypotenusâ BC sonatur quadrans, erit etiam latus AC aut ambo latera AB AC quadrantes (§.cit.)

Fig. 30

ac

ac proinde iterum *angulus B est rectus, angulique C mensura arcus BA, vel in secundo casu tres anguli erunt recti, tres verò arcus quadrantes; ergò in quolibet casu patet rem absque ullo calculo expediri posse. Caterum singulis Problematis exempla addidimus, ut usum sphericæ doctrinæ in faciliorem quorundam problematum Astronomicorum resolutione notent Tyrones, ne huc usque acrem sibi captaſſe videantur; quæ quidem absque aliquo Trigonometiæ detrimento prætermitti poterunt ab illis qui prima sphaeræ celestis rudimenta non didicerunt.*

S E C T I O I.

*De Resolutione Triangulorum Sphericorum
rectangulorum.*

P R O B L E M A I.

*In triangulo spherico ABC rectangulo ad B datâ
hypothensâ AC 48°, & uno angulorum
obliquorum, puta C 24° 30', invenire
latus oppositum AB, vel adjacens BC,
aut alterum obliquum A.*

Fig. 34

§. 61. 1°. Examinetur qualistriū partium, quæ in quæſtionem veniunt, tanquam media considerari possit; in nostro casu invenietur AB latus quod quæritur esse partem mediam respectu sejunctarum, hypothensæ scilicet datæ AC, & anguli pariter dati C. Applicetur ergò huic casui propositio tertia, inferendo, ut sinus totus ad sinum alterutrius partium sejunctarum, puta hypothensæ AC, qui in Tab. proſtat, ita sinus alterius partis sejunctæ, nempe anguli C ex tab. etiam crucendi, ad cosinum par-

tis

tis mediæ AB, hoc est ad sinum ipsius AB, assumpsimus enim complementum lateris AB ad quadrantem pro ipso latere, complementi verò hujus cosinus idem est ac sinus arcus AB. Quibus positis quum hujus proportionis primi tres termini noti sint, quartus etiam innotescet, qui exprimet Sinum lateris quæsitæ AB, cui in tab. inveniuntur gradus correspondentes. Proinde residuo log-mi radii, cui est 0, addantur log-mi correspondentes gradibus 48° , & $24^{\circ} 30'$, ab horum summâ deleatur prima figura, unitas nempe a sinistra, ut (§. 73 lib. 1) dictum est, residuum est log-mus conveniens lateri AB, hoc est gradibus $17^{\circ} 56' 58''$ quam proxime.

$$\text{L. S. AC } 48^{\circ} \quad 9.8710735$$

$$\text{L. S. C } 24^{\circ} 30' \quad 9.6177270$$

$$\text{Sum. cor. } 9.4888005 \quad \text{L. S. AB}$$

Illud hic superest advertendum, eundem sinum qui arcui $17^{\circ} 56' 58''$ competit, etiam competere arcui $162^{\circ} 3' 2''$ qui prioris est complementum ad semicirculum (§. 7 lib. 1) unde videndum est, quoad fieri potest, an arcus quæsitus AB sit major vel minor quadrante, hoc est, ejus species determinanda ex affectionibus sphericis: in nostro quidem casu, in quo hypotenusa AC posita est 48° scilicet quadrante minor, & angulus C acutus, determinabitur latus oppositum AB quadrante minus (§. 43 47) hoc est $17^{\circ} 56' 58''$ prouti positum est.

Latus AB etiam inveniri potest per (§. 53) inferendo, ut sinus totus ad sinum hypotenuse AC 48° , ita sinus anguli C $24^{\circ} 30'$ ad sinum lateris quæsitæ AB, in quo casu eodem modo disponuntur iidem log-mi, ut in exemplo factum est. Priorem tamen methodum sequi libuit, ut in eâ, utpote generali, studio si exerceanur.

Si vice anguli C datus sit angulus A eodem modo inveniri latus oppositum CB per se manifestum est. Q. e. 1^o. i.

II^o. Sit invenendum latus adjacens BC; in hoc casu angulus datus C est pars media, cujus respectu hypothenusa CA & latus AB sunt partes conjunctæ: erit ergo sinus totus ad cotangentem partis alterutrius conjunctæ AC, ut cotangens partis alterius conjunctæ AB, hoc est, (quia complementum ad quadrantem lateris AB sumplimus pro ipso latere, complementi verò hujus cotangens eadem est ac tangens lateris AB) ut tangens lateris AB, ad cosinum partis mediæ, anguli C scilicet; quum igitur in hac proportionem primi duo termini & quartus noti sint, tertius non ignorabitur. A summa ergo log-rum sinus totius, cosinus 24^o 30' resubui log mi cotangentis 48^o demptâ a

L. R. 10. 0000000

L. Cos. C 9. 9590229

R. L. Cot. AC 455626

Sum. cor. 1. 00045855

L. T. BC.

similita unitate e prima figura, hoc est, non computato log m) radii, provenit log-mus tangentis BC cui correspondet quam proximè 45^o 18'

Hic denuo notandum tangentem, quæ competit 45^o 18', competere etiam 134^o 42' prioris nempe arcus complementum ad semicirculum; verum in nostro casu BC esse 45^o 18' sive quadrante minus patet ob rationes superius allatas.

III^o. Quærendus sit denique obliquus A; hypothenusa AC est pars media, anguli verò A & C obliqui sunt partes conjunctæ; ac proinde sinus totus est ad cotangentem anguli A, ut cotangens anguli C ad cosinum hypothenusæ AC. Ergo summa log-mi cosinus hypothenu-

LU 62

nusæ AC datæ & residui log-mi cotangentis anguli C pariter dati dat log mum cotangentis anguli quæsitæ A, deletâ prius a sinistris figurâ 2, ob residuum cotangentis anguli C, quæ major est radio (§. 73 lib. 1)

Huic log-mo competunt ex Tab. 16°

57' 30", proinde angulus A est 73° 2' 30".

L.R.	10.0000000
L. Cot. AC	9.8255109
R. L. Cot. C	9.6587040

S m. cor. 9.4842149 L. Cot. An. A

In hoc casu ob datam hypotenusam AC, & angulum C, patet angulum A esse specie notum & in nostro exemplo acutum (§. 48)

EXEMPLUM.

Datâ Eclipticæ obliquitate 23° 29' puncti cujuscunque eclipticæ dati, puta 4° 50' II declinationem invenire.

Referat circulus ECF æquatorem cujus polus sit D; sit insuper ACG ecliptica, in qua datum punctum sit K, & circulus declinationis per polum ductus DKH, punctum verò æquinoctii vernalis sit in C. Quoniam triangulum CKH est rectangulum (§. 18), & in eo data est

hypotenusæ CK 64° 50'

L. S. CK 9.9566844

duorum nempe signorum

L. S. C 9.6004090

cum 4° 50', insuper an-

Sum. cor. 9.5570934 L. S. HK

gulus C 23° 29', nullo

negotio invenitur declinatio quæsitæ HK 21° 8' 25". Hoc ergò mediante Problemate faciliè construantur Tabulæ Astronomicæ declinationum singulorum graduum eclipticæ.

Fig. 22.

PRO.

PROBLEMA II.

Fig. 34 Data hypotenusa AC 48° . atque uno laterum
puta AB $17^\circ 56' 58''$ invenire angulum
C huic lateri oppositum, vel adja-
centem A, aut reliquum
latus BC.

§. 62. I°. AB est pars media, disjunctæ ve-
rò AC & C; ergò summa log-rum sinus AB

L. S. AB 9.4888005

R. L. S. AC 1289265

Sum. 9.6177270 L. S. An. C

& residui log mi sinus
AC dat log mum sinus
anguli C, cui corre-
spondent $24^\circ 30'$, ut
supra posuimus.

Etiam in hoc casu ex datis liquet angulum
C esse specie notum, & in nostro exemplo acutum.

II°. Si quæratür angulus A hic idem est
pars media, conjunctæ verò AC AB; ergò si a
summa log-rum cotangentis AC & tangentis AB

L. Cot. AC 9.9544374

L. T. AB 9.5104643

Sum. cor. 9.4649017 L. Cot. An. A

dematur log mus radii,
remanet log-mus cosin-
us anguli A, cui in-
veniemus correspondere
 $73^\circ 21', 30''$, ut su-
pra etiam invenimus.

Quoniam AC & AB data sunt, etiam angu-
lus A est specie datus, & in nostro exemplo a-
cutus.

III°. Sit denique quærendum latus BC; AC
est pars media, disjunctæ verò AB & BC, ac
proinde summa log-rum cosinus AC, & re-

L. Cos. CA 9.8255109

R. L. Cos. AB 216693

Sum. 9.8471802 L. Cos. CB

sidui log-mi cosinus
AB dat log-mum cosin-
us CB, ergo CB est
 $45^\circ 18' 5''$ ut suprà.

Quò-

Quoniam CA & AB data sunt, etiam latus CB erit specie notum, & in nostro exemplo quadrante minus.

EXEMPLUM.

Data declinatione HK $21^{\circ} 3' 25''$ puncti cuiuscunque Eclipticæ dati K puta $14^{\circ} 50' 11''$ ascensionem rectam CH invenire.

Fig. 22

Quoniam in rectangulo CHK data est hypotenusa CK & latus HK facile invenitur latus reliquum CH ascensionem scilicet rectam quaesitam $62^{\circ} 52' 29''$. Hoc modo

construuntur Tabula Astro-	L. Cos. CK	9.6286472	
nomica Ascensionum re-	R. L. Cos. HK	302596	
clarum singulorum gra-	Sum.	9.6589068	L. Cos. CH
duum eclipticæ.			

PROBLEMA III.

Dato uno laterum, puta AB $17^{\circ} 56' 57''$ & angulo adjacente A $73^{\circ} 2' 30''$ invenire latus reliquum CB, vel angulum reliquum C, aut hypotenusam AC.

Fig. 34

§. 63. I^o Quoniam AB est pars media, conjunctæ vero CB & A a summa log rum sinu totius, sinus AB, residui log mi cotangentis A dempto log mo radii, sive figura 2. a sinistris in unitatem commutata, provenit log-mus tangentis CB cui correspondent ferè $45^{\circ} 18'$ ut supra.

L. R.	10.0000000	
L. S. AB	9.4888005	
R. L. Cor. A.	5157851	
Sum. cor	10.0045856	L. T. CB

In hoc quoque casu ob datum latus AB & angulum A latus CB esse specie notum, & in
I no.

130

nostro exemplo quadrante minus patet (§. 48).

II°. Sit inveniendus angulus C; hic idem est pars media, disjunctæ vero AB & A: ergo a summa log-rum cosinus AB & Sinus anguli A dem-

L. Cos. AB 9.9783307

L. S. A. 9.9866928

Sum. cor. 9.9590235 L. Cos. C

pto radii log-mo, remanet log-mus conveniens cosinui anguli C, unde invenitur C 24° 30', ut supra posuimus.

Quoniam latus AB datum est, & angulus A patet, quæsitum angulum C specie notum esse debere (§. 48) & in nostro exemplo acutum.

III°. Si denique quæzatur hypotenusa AC angulus A est pars media, conjunctæ verò AC & AB; si ergo a summa log rum sinus totius & cosinus anguli A dematur log mus tangentis lateris AB, hoc est, si addatur log-mus cosinus A residuo log-mi tangentis AB, provenit

I. Cos. A 9.4649009

R. L. T. AB 4895387

Sum. 9.9544396 L. Cos. AC.

log mus cotangentis hypotenuse AC; unde AC est 48°, ut supra positum est.

Quoniam latus AB notum est & angulus A patet, hypotenusam esse specie notam, & in nostro exemplo quadrante minorem.

E X E M P L U M.

Fig. 22. Datâ ascensione rectâ CH, 61° 52' 29"
& obliquitate Eclipticæ 23° 29',
invenire angulum Eclipticæ
CKH cum meridiano.

In rectangulo CHK datum est latus CH, & angulus adjacens HCK; ergo invenietur angulus quæsitus

finus HKC $79^{\circ} 31'$
 $56''$. Hoc pa. To con-
 struuntur Tabulae A-
 stronomicæ angulo-
 rum eclipticæ cum
 Meridiano.

L. S. HCK	9. 6004090	
L. Col. CK	9. 6589068	
Sum. cor.	9. 2593158	L. Col. HKC

PROBLEMA IV.

Dato uno laterum puta AB $17^{\circ} 56' 53''$ & an- Fig. 34
 gulo huic opposito C $24^{\circ} 30'$ invenire latus
 reliquum CB vel angulum reliquum A, aut
 hypotenusam AC.

§. 64. 1°. Latus CB est pars media, AB
 & C verò conjunctæ, ergò ex regulâ a sum-
 mâ log-rum cotangentis C & tangentis AB
 dempto log-mo ra-
 dii, remanet log-mus
 sinus lateris CB, cui
 correspondent 45°
 $18'$, ut supra.

L. Cot. C	10. 3412960	
L. T. AB	9. 5104643	
Sum. cor.	9. 8517603	L. S. CB.

II°. Sit invenendus angulus A; in hoc
 casu C est pars media, disjunctæ verò A &
 AB, ergò ex regulâ a log-mo cosinus C adda-
 tur residuum log mi
 sinus AB provenit
 log-mus sinus A, cui
 correspondent 73°
 $2' 30''$ ut supra.

L. Col. C.	9. 9590229	
R. L. Col AB	216693	
Sum.	9. 9806922	L. S. A

III°. Quæritur modo hypotenusam AC, erit
 AB pars media, C & AC sejunctæ; ac pron-
 de log-mus sinus
 AB cum residuo log-
 mi sinus anguli C
 dat log-mum sinus
 AC, cui correspon-
 dent 48° , ut supra.

L. S. AB	9. 4888005	
R. L. S. C.	3812730	
Sum.	9. 8710735	L. S. AC.

I 2 In

In tribus hujusce Problematis casibus illud animadvertendum ex duobus tantum cognitis AB & C species quæstorum determinari non posse, hoc est, ignoratur an latus quæsitum CB vel hypothenuſa si hæc quæritur, sit quadrante minor vel major, & angulus A sit obtusus vel acutus; unde aliquid aliud ad hanc determinationem cognitum habere necesse est. Nos autem determinavimus speciem quæstorum in nostro exemplo supponendo eam aliunde notam esse quam ex tribus datis.

E X E M P L U M.

Fig. 42 Data poli loci cujuscunque elevatione PR 40°
 $30'$ una cum solis declinatione DS $18^{\circ} 20'$
 invenire differentiam Ascensionalem OD :

*In hoc casu arcus HR refert loci dati horizon-
 tem, EL Eclipticam, AQ æquatorem, P polum,
 & S locum Solis in hemisphærio Australi: quum
 ergo PS sit circulus declinationis angulus ad D*

L. Cot. D 9. 9366105

L. T. DS. 9. 5203052

Sum. cor. 9. 4569157

L. S. OD

*rectus est, ac per con-
 sequens in rectangulo
 DSO ob datam DS de-
 clinationem solis, &
 angulum huic opposi-
 tum DOS, complemen-*

*tum scilicet elevationis poli ad quadrantem, cujus
 mensura est HA, facild invenietur, & determina-
 bitur arcus OD $16^{\circ} 38' 25''$. Plura igitur me-
 diante hoc Problemate resolvuntur quæſita, quæ ab
 differentia Ascensionali dependent, in Astronomia
 maximi quidem usus.*

PRO-

PROBLEMA V.

Datis duobus lateribus AB $17^{\circ} 56' 57''$, & CB Fig. 34
 $45^{\circ} 18'$ invenire alterutrum obliquorum
 puta C, aut hypotenusam AC.

§. 65. BC est pars media, conjunctæ verò
 C & AB; ergò summa logarithmorum sinuum BC &
 residui logarithmi tan-
 gentis AB est log- L. S. BC 9.8517637
 mus cotangentis an- R.L.T. AB 4895357
 guli C, cui compe- Sum. 10.3412994. L. Cot. C
 tunt $24^{\circ} 30'$, ut
 supra.

In hoc casu ob data duo latera species quæ-
 sit anguli innotescit.

II°. Sit inveniendâ hypotenusa AC, hæc est
 pars media, disjunctæ verò AB & BC, ergo
 si a summâ logarithmorum cosinus AB & cosinus
 CB logarithmus radii de-
 matur, remanet log- Log. Cos. AB 9.9783327
 mus cosinus AC, cui L. Cos. CB 9.8471821
 correspondent 48° , Sum. cor. 9.8255128 L. Cos. AC
 ut supra.

Quoniam latera duo data sunt ex eorundem
 specie innotescet ea hypotenusa.

E X E M P L U M.

Data poli Elevatione PR $40^{\circ} 50'$ Solis in Fig. 42
 æquatore existentis altitudinem FB horâ
 septimâ antemeridianâ invenire.

Arcus MFB, qui per zenith M loci dati tran-
 sit, refert circulum altitudinis & quadranti æ-
 qualis est; hujus beneficio efformatur triangulum
 I 3 FAM

FAM ad *A* rectangulum in quo datum est latus *AM* $49^{\circ} 10'$ complemento scilicet elevationis poli aequale, & ut habeatur latus *AF* exprimens horas quinque datarum residuas ad meridiem, metodo Astronomis usitata convertantur horæ hæc quinque in gradus Aequatoris; quo facto prævenit arcus *AF* $75^{\circ} 12' 20''$: quibus datis, in triangulo *AFM* innotescet hypobenusæ *FM* $78^{\circ} 51' 37''$, cujus residuum ad quadrantes est altitudo quasi-*ta* *FB* $11^{\circ} 8' 23''$.

L. Cos. AF	9.4071392
L. Cos AM	9.8788748
Sum. cor.	9.2860140
L. Cos. EM	

PROBLEMA VI.

Fig. 34 Datis duobus angulis obliquis *A* $73^{\circ} 21' 30''$ & *C* $24^{\circ} 30'$, invenire alterutrum laterum puta *AB*, vel hypobenusam *AC*.

§. 66.	1° <i>C</i> est media, disjunctæ vero <i>A</i> & <i>AB</i> : summa igitur log. mi cosinus <i>C</i> & residui log mi sinus <i>A</i> dat log. mum cosinus <i>AB</i> , cui competunt $17^{\circ} 56' 57''$, ut supra.
L. Cos C	9.9590229
R. L. S. A	193072
Sum.	9.9783301
L. Cos. AB	

Quoniam dati sunt obliqui cognoscitur species lateris quæsitæ.

II° Inveniendæ sit hypobenusæ, hæc est pars media, conjunctæ verò *A* & *C*: a summa ergò log. rum cotangentis anguli *A* & cotangentis anguli *C* dempto radii log. mo, remanet log mus cosinus *AC* cui correspondent 48° ut supra.

L. Cor. A	9.4842149
L. Cor. C	10.3412900
Sum. cor.	9.8255109
L. Cos. AC	

Quoniam dati sunt obliqui, species hypobenusæ non ignorari necesse est.

EXEM.

E X E M P L U M.

Data Eclipticæ obliquitate $HGK\ 23^{\circ}\ 29'$, & Fig. 22
 angulo ejusdem K cum meridiano
 $79^{\circ}\ 31'\ 56''$ invenire puncti K
 ascensionem rectam CH .

Quoniam in rectangulo CHK duo anguli C
 & K dati sunt nullo
 negotio invenietur la- $L.Cof.HKC$ 9.2593158
 tus $CH\ 62^{\circ}\ 52'\ 29''$ $R.LSHCK$ 3995910
 uti positum est exem- $Sum.$ 9.6589068 $L.S\ CH$
 plo tertio.

S E C T I O II.

De resolutione Triangulorum Sphæricorum
 obliquangulorum.

P R O P O S I T I O I.

In omni triangulo sphærico ABC , sumptis duo-
 rum quorumlibet laterum, puta $AB\ BC$, diffe-
 rentiâ AM , erit rectangulum sub sinibus di-
 fferentiarum laterum $AB\ BC$ ad quadratum radii, ut
 rectangulum sub sinu arcus semisummæ basis AC
 & laterum differentiæ AM , & sub sinu semi-
 differentiæ eorundem arcuum, ad quadratum
 sinus dimidii anguli B lateribus $AB\ BC$ com-
 prebent.

Fig. 35

§. 67 Producantur latera $BC\ BA$: facto polo
 in B quadrantis intervallo describatur circulus
 NP , cujus planum erit plano circuli AB per-
 pendiculare (§. 18); supra planum chartæ proin-
 de elevatum perpendiculariter consideretur: si-
 mili.

militer per punctum C planum ita ductum concipiatur, ut plano chartæ, hoc est, circuli AB sit etiam perpendiculare, & plano prioris circuli NP parallelum: arcus BM ergo æquabitur arcui BC, æquales enim sunt CP MN, & BP BN quadrantes ex constr. ac per consequens perpendiculares PG CH cadent in communes sectiones NO MF horum planorum & circuli BAN. Ex sphaeræ centro O ducatur radius OA, & ad eum perpendiculares ML HI; quod si per rectas CH HI planum transire cogitemus, erit recta AI ad CI perpendicularis, * proinde AI est sinus versus arcus AC, & AL sinus versus arcus AM, IL denique horum sinuum versorum differentia. Ducatur ad radium OB perpendicularis AE; insuper connectantur puncta CF & PO, item PN, & CM Quum rectæ PO ON PN sint parallelæ rectis CF FM CM, & angulos constituent, erunt triangula duo PON, MCF æquiangula * & similiter a perpendicularibus PG CH divisa; quare erit FM ad ON ut MH ad NG; item ob triangula AOE, DIH DLM æquiangula est AE ad AO ut DI ad DH, five ut DL ad DM; ergo etiam AE ad AO, ut DI plus DL ad DH plus DM, hoc est AE ad AO ut IL ad MH; proinde erit etiam AE in FM ad AO in ON, ita IL in MH ad MH in NG, five ut IL ad NG qui est sinus versus arcus PN five anguli B (§.19), five ut recta IL ducta in dimidium radii, ad NG ductam pariter in dimidium radii; sed IL differentia sinuum versorum ducta in dimidium radii æquatur rectangulo sub sinu arcus semisummæ basis AC & laterum differentię AM, & sinu semidifferentię eorundem arcuum, (§.11 lib.1.) insuper sinus versus NG anguli B ductus in dimidium radii æquatur quadrato sinus

* El.x1 def.4.

* El.x1 Prop.
10.

nus dimidii eiusdem anguli B (§. 10 lib. 1) ergo æqualibus æqualia substituendo in primâ proportionem AE in FM, hoc est, rectangulum sub sinibus laterum AB BC est ad AO in ON, hoc est radii quadratum, ut rectangulum sub sinu arcus semisummæ basis AC & laterum differentię AM, & sub sinu semidifferentię eorundem arcuum, ad quadratum sinus dimidii anguli B. Q. e. d.

S C H O L I O N.

§ 68. Theorematis huius & sequentis beneficio resolvuntur casus Trigonometriæ sphericæ difficilissimi Problematis 3 & 6 comprehensi, quum ex præcedenti Theoriâ id præstari non possit. Plures certè modos exhibent auctores, quibus idem consequatur; hunc tamen nobis eligendum visus est, utpote qui nec reliquis difficiliorem demonstrationem, nec praxim requirat. Caterum sex sequentibus Problematis casus omnes trianguli Obliquanguli sphericæ comprehendimus, & resolutos dare decrevimus, ut studiosi habeant quo se exerceantur.

P R O P O S I T I O II.

Triangulum sphericum quodcunque transformari potest in aliud, in quo singula latera sint singulorum angulorum alterius complementa ad semicirculum, anguli verò oppositi oppositorum laterum alterius sint pariter complementa ad semicirculum.

§. 69. Facto polo in singulis angulis A B C *Fig. 36* 37 trianguli ABC quadrantis intervallo describantur arcus KP PD KD, ex quibus novum oritur triangulum DKP, quod recessitas conditio-

tiones habet, five latera sint quadrante minora ut in fig. 36, five majora ut in fig. 37, five permixtim. Producantur enim latera trianguli ABC usque dum ex una, & alia parte concurrant cum arcubus alterius trianguli DKP; quoniam ex puncto A quadrantis intervallo descriptus est arcus KP; item ex puncto C alius DK, necessario ambo per polum circuli AC transire debent (§. 16), qui erit in puncto intersectionis eorum K: similiter ostenditur punctum P esse polum circuli AB, & D polum circuli BC. Hisce positis DI & KF sunt ambo quadrantes, hoc est DI cum KF, five DK cum FI efficient semicirculum; ac per consequens latus DK trianguli DKP est complementum ad semicirculum lateris FI, five (quum hic sit mensura illius) anguli C: eadem ratione patet DP esse complementum ad semicirculum arcus GH five anguli B, & KP complementum ad semicirculum arcus OQ, five anguli A. Idem ostenditur de angulis: Nam IC & BH sunt quadrantes, ergo IC cum BH, five IH cum BC conficiunt semicirculum, proinde arcus IH, five angulus D (est enim ille hujus mensura) est complementum ad semicirculum lateris BC. Idem dic de angulis B & C. Q. e. d.

PROBLEMA I.

Fig. 38 *Datis in obliquangulo duobus lateribus puta BC*
 $39^{\circ} 29'$; AC $63^{\circ} 30' 48''$ & an-
 gulo A $43^{\circ} 20'$ uni eorum opposito,
 invenire alterutrum angulorum
 B vel C aut tertium latus AB.

§. 701^o Fiat ut sinus lateris CB dati ad sinum anguli oppositi pariter dati A, ita sinus alterius lateris dati AC ad sinum anguli oppositi quæ-
 siti B (§. 53) cujus tamen species, nisi aliunde

de quam ex tribus
 datis nota sit, haud
 determinari potest:
 unde in nostro casu
 si poratur angulus
 quæsitus B acutus,
 inveniatur esse 79°
 $9'59''$.

11°. Sit inveniendus angulus C duobus la-
 teribus datis comprehensus; ex eo demissus intel-
 ligatur arcus perpendicularis CE, qui, si an-
 gulus ignotus B sit ejusdem speciei anguli no-
 ti A, cadet intra, si diversæ extra triangulum
 ad partem anguli exterioris acuti (§. 46) Inve-
 niantur modo in triangulo rectangulo ACE, in
 quo notus est angulus A & hypotenusa AC,
 angulus ACE & latus CE (§. 61) quæ etiam
 ex datis nota erunt specie (§. 43): item
 in rectangulo ECB ob datam hypotenusam BC
 & latus CE innotescet angulus BCE atque etiam
 specie, ac proinde si is prius invento ACE ad-
 datur, perpendicularo intra cadente ut in fig.

38, vel detrahatur,
 extra cadente ut in
 fig. 39, oriuntur angu-
 lus quæsitus C. In no-
 stro exemplo (fig. 38)
 ponatur angulus B
 specie acutus, erit
 perpendicularis CE
 $38^{\circ} 38' 49''$, an-
 gulus ECB $13^{\circ} 55'$
 $31''$, & angulus ACE
 $68^{\circ} 38' 53''$, ho-
 rum angulorum sum-
 ma dat quæsitum C
 $82^{\circ} 34' 4''$.

L. S. An. A.	9.8364771	
L. S. AC	9.9590699	
R. L. S. BC	1966428	
Sum. cor.	9.9921898	L. S. An. B.

L. S. AC	9.9590699	
L. S. An. A	9.8364771	
Sum. cor.	9.7955470	L. S. CE

L. Cor. AC	9.6584361	
L. T. CE	9.9028901	
Sum. cor.	9.5613262	L. Cos. ACE

L. Cor. BC	10.0841529	
L. T. CE	9.9028901	
Sum. cor.	9.9870430	L. Cos. ECB

III °,

III^o. Quærendum sit denique latus AB: demisso perpendicularo CE in latus quæsitum, obliquangulum resolvetur in duo rectangula AGE, ECB; in quorum primo ob datam hypotenusam AC & angulum A invenietur segmentum AE etiam specie; item in alio triangulo ECB ob data EC CB invenietur EB atque etiam specie; quod segmentum si priori invento addas, perpendicularo intra cadente ut in fig.

L. Cof. An. A	9.8617576	
R. L. Cot. AC	34 ¹ 5939	
Sum.	10. 2033215	L.T.AE

L. Cof. BC.	9.8875102	
R. L. S. CE	1073440	
Sum.	9.9948542	L. Cof. BE

exemplo si angulus B ponatur acutus, erit AE 57° 56' 51" EB verò 8° 48' 8" quorum summa 66° 44' 59" est latus quæsitum AB.

E X E M P L U M.

Fig. 43 Data stellæ alicujus S declinatione DS 41° 25", longitudine GT 31° 26', & eclipticæ obliquitate 23° 29" invenire latitudinem TS.

L. Cof. An. M.	9.9310750	
R. L. Cot. MP	9.6379563	
Sum.cor.	9.5690313	L.T.MN

Quoniam in triangulo MPS puncta M & P referunt polos Eclipticæ & æquatoris, arcus MP erit obliquitati eclipticæ æqualis: similiter arcus TE, qui est complementum ad qua.

quadrantem longitudinis
datæ, æquatur angulo M;
arcus denique PS est com-
plementum declinationis
DS; quum igitur in trian-
gulo MPS tria data sint,
ducto perpendiculari PN in
latus quæsitum, innotet
segmentum MN 20°
 $20' 24''$ & NS $45^{\circ} 17'$
 $49''$, quorum summa 65°
 $38' 13''$ est complemen-
tum latitudinis quæsitæ,
hoc est TS $24^{\circ} 21' 47''$.

L. S. MP	9.6004090	
L. S. TE	9.9310750	
Sum.cor.	9.5314840	L. S. PN

L. Cof. PS	9.8205496	
R. L. Cof. PN.	266742	
Sum.	9.8472238	L. Cof. NS

PROBLEMA II.

Datis in Obliquangulo duobus angulis puta $A 43^{\circ}$ Fig. 38
 $20'$ & $B 79^{\circ} 9' 59''$ & latere BC $39^{\circ} 29'$
uni eorum opposito invenire alterutrum
latus AC vel AB, aut tertium
angulum C.

§. 71. I^o Fiat ut sinus anguli dati A ad si-
num lateris oppositi dati BC, ita sinus alterius
anguli dati B ad sinum lateris oppositi quæsi-
ti AC, cujus species nisi prius cognita fuerit
haud determinari potest:

Ponatur in nostro casu	L. S. BC	9.8033572	
latus quæsitum AC qua-	L. S. An. B.	9.9921898	
drante minus, invenie-	R. L. S. An. A.	1635229	
tur esse $65^{\circ} 30' 48''$	Sum.cor.	9.9590699	L. S. AC
ut positum est in Probl.			

præc.

II^o. In latus quæsitum AB demittatur ex
angulo opposito perpendicularis arcus CE, qui
ex datis angulis A & B cognoscetur an intus,

vel extra cadat; resolvitur aded obliquangulum in duo rectangula, in quibus segmenta AE EB ut in casu 3^o probl. præc. facile determinantur, quorum summa in primo casu, vel differentia in secundo dat latus quæsitum AB 66° 44' 59". In hoc etiam casu necesse est ut aliud latus AC sit saltem specie determinatum; quum enim vices gerat hypotenusa in triangulo ACE ex eius affectione dignoscitur cuiusnam speciei sit segmentum AE.

III^o Sit denique angulus C inveniendus. Ex eo in latus oppositum ducto perpendicularo CE, quod ex datis angulis A & B cognoscetur an intus vel extra cadat, obliquangulum resolvetur in duo rectangula ACE ECB, in quibus invenientur anguli ECB ACE ob datam hypotenusam BC & angulum B (§.61), horum angulorum summa in primo casu, vel differentia in secundo est angulus quæsitus C. Ubi notandum est oportere etiam latus aliud AC saltem specie notum esse, utpote hypotenusa trianguli ACE, ex qua determinari possit utrum angulus ACE obtusus sit an acutus: ex quo factum est ut Trigonometrici casus hos sex huc

L. Cos. BC	9.8375102	
R. L. Cot. An. B	7181301	
Sum.	10.6056403	L. Cot. ECB

L. Cos. An. A	9.8617576	
R. L. Cos. CE	1073440	
Sum.	9.9691016	L. S. ACE

usque a nobis contemplatos vocaverint *dubios*. In nostro exemplo angulus ECB reperitur, & determinatur 13° 55' 33", & posito latere AC quadrante minore, angulus ACE est 68° 38' 33", quorum summa 82° 34' 6" est angulus quæsitus C, ferè ut invenimus in casu 2^o probl. præc.

EXEM.

E X E M P L U M

Datâ duarum stellarum ST distantia TS 18° Fig. 44
 $51^{\circ} 48''$, & earundem longitudinibus
 $\Delta H 33^{\circ} 28' 39''$, $\Delta l 40^{\circ} 1' 44''$
 cum angulo STP $159^{\circ} 39' 50''$, in-
 venire stellæ S latitudinem HS.

Datis in triangulo STP angulo STP 159° angulo
 SPT longitudinum datarum differentia cum late.

re TS facillè invenitur PS

$80^{\circ} 0' 26''$, complemen-

tum latitudinis quæsitæ.

undè HS $9^{\circ} 59' 34''$ se.

re.

L. S. TS 9.5096214

L. S. STK 9.5409910

R. L. S. HI 9425530

Sum. cor. 9.9931654

L.S. PS

P R O B L E M A III.

Datis in obliquangulo duobus lateribus puta

BC $39^{\circ} 29'$, AB $66^{\circ} 45''$ cum angulo

comprehensò B $79^{\circ} 9' 59''$ inve-

nire alterutrum angulorum A

vel C aut tertium latus AC.

Fig. 38 $39^{\circ} 40'$

§. 72. I^o Ex angulorum quæditorum uno pu-
 ta C demittatur perpendicularum EC dividens
 obliquangulum in duo rectangula ECB ECA;
 in quorum primo ob datam hypothenusam BC
 & angulum B inveniuntur & specie determi-
 nantur angulus ECB, perpendicularum CE, &
 segmentum EB: Quibus inventis duplex cas-
 us distingui debet: primò enim sit angulus
 datus B acutus, perpendicularum cadens versus
 angulum acutum abscindet inventam portio-
 nem EB, quæ si minor est latere dato AB ut
 in fig. 38 signum est perpendicularum intra tri-
 angu-

angulum cadere, ac proinde etiam angulum A esse acutum (§. 49), unde facile in rectangulo ACE inveniuntur & specie determinantur

L.S. An. B.	9.9921898	
L. S. BC	9.8033572	
Sum. cor.	9.7955470	L.S.CE
L. Cof. BC	9.8875102	
R. L. Cot. B	7181301	
Sum.	10.6056403	L.Cot.ECB
Log. Cof. B.	9.2740596	
R.L.Cot.BC.	9.9158471	
Sum. cor	9.1899067	L.T.EB
L. S. CE	9.7955470	
R. L. T. AE	9.7966695	
Sum. cor.	9.5922165	L.Cot. ACE
L.S.AE	9.9281728	
R.L.T.CE	971103	
Sum.	10.0252831	L. Cot. An.A

anguli ACE & A, ac per consequens summa angulorum ACE & ECB est angulus C: si verò sit major, perpendicularum cadet extra triangulum in latere AB versus A producto, ut in fig. 40, ac proinde angulus A est obtusus: in triangulo igitur ACE ob inventum perpendicularum CE, & latus EA differentia nempe lateris dati AB & segmenti inventi BE inveniuntur & specie determinantur anguli EAC, hoc est, CAB quæsitus, & ECA, qui detractus a priori invento ECB dat quæsitum C. Secundus casus est si angulus

datus B sit obtusus ut in fig. 39, perpendicularum CE vel extra vel intra triangulum cadere potest, prouti nempe angulus quæsitus A obtusus vel acutus ponatur; unde in hoc casu necesse est angulum hunc præter tria nota specie saltem notum esse debere, ut reliqua determinentur. Hoc sedulo animadvertendum duximus, ne Problema hoc tribus tantum notis absolutè in omni casu determinari posse Tyrones credant; quum præcipue distinctio hæc perperam a Trigonometricis confundatur. In nostro exemplo datis

dati in rectangulo ECB angulo B & BC inveniuntur CE $38^{\circ} 38' 49''$, ECB $13^{\circ} 55' 33''$, EB $8^{\circ} 48' 8''$; quum ergo angulus B positus fuerit acutus, & BE minor sit BA, perpendicularum cadet intra triangulum, proinde in rectangulo ACE datis duobus lateribus AE & CE inveniatur angulus A $43^{\circ} 20'$, & ACE $68^{\circ} 38' 8''$, unde angulus C $82^{\circ} 34' 7''$.

II^o. Sit modo inveniendum latus AC: quærantur in triangulo CEB perpendicularum CE, & segmentum BE, ut in primo casu factum est, hinc innotescet alterum segmentum AE, unde in rectangulo ACE inveniatur latus quæsitum AC. In hoc quoque casu illud observandum quod in præcedenti monuimus; nempe si angulus datus B sit acutus, per tria tantum nota determinatur quæ-

situm cujusnam speciei sit;	L. Cos. EC	9.8926560
sed si obtusus, requiritur	L. Cos. AE	9.7248425
specie notum saltem aliquid aliud esse.	Sum.cor.	9.6174985
	L. Cos. AC	

E X E M P L U M

Data stellæ alicujus S, puta Lucidæ γ supra caput, ad annum 1700 longitudine AH $33^{\circ} 28' 29''$, & latitudine Boreali SH $9^{\circ} 56' 30''$, item alterius T, puta in pede Australiori Andromedæ longitudine AI $40^{\circ} 21' 44''$, & latitudine Boreali IT $27^{\circ} 41' 10''$ earundem distantiam TS invenire.

Fig. 44

Quoniam longitudines AI AH data sunt, dabitur arcus HI, sive angulus HPI, qui earundem est differentia: ac proinde in triangulo PST datis hoc angulo, & lateribus SP TP, quæ latitudinum datarum sunt complementa ad quadrantem, duobus perpendicularo SE, inveniatur arcus PK $79^{\circ} 58' 38''$

K

38''

L. Col. HI	9.9971522	
h.L.Col.PS	7557314	
Sum.	10.7526836	L.T.PK
S. PS.	9.9934292	
L.S. SPK.	9.0571967	
Sum.cor.	9.0506259	L.S.SK
L.Col.SK	9.9972411	
L.Col.TK	9.9787851	
Sum.cor.	9.9760262	L.Col.TS

38^m, quum autem latus PT
 sit 62^o 12' 30^m manife-
 stum est perpendicularum SK
 extra triangulum cadere;
 differentiam verò TK esse
 17^o 43' 48^m, & ipsum
 perpendicularum SK 6^o 27'
 5'', unde distantia quæsta
 TS 18^o 51' 48'', quæ
 differt excessu 3' 46'' ab observatâ harum fixa-
 rum distantia a Tychone.

PROBLEMA IV.

Fig. 38 *Datis in obliquangulo duobus angulis puta B*
 $79^{\circ} 9' 39''$, $C 82^{\circ} 34' 4''$ cum la-
 tere intermedio BC $39^{\circ} 29'$ inve-
 nire alterutrum laterum AC vel
 AB, aut tertium angulum A.

§. 73. Eodem modo resolvitur Problema hoc
 quo usi sumus in præcedenti: ducto enim ex
 uno angulorum datorum, sit C perpendicularu-
 lo, obliquangulum resolvitur in duo rectan-
 gula ACE ECB, in quo quum data sit hypo-
 thenusa BC & angulus B, inveniuntur perpen-
 diculum CE, angulus ECB, & segmentum
 BE: Quibus cognitis duplex etiam casus di-
 stingui debet pro speciei determinatione; primò
 si angulus datus B sit acutus, perpendicularum ca-
 dens versus partem anguli acuti abscindet angu-
 lum ECB inventum aut minorem, aut majorem
 angulo dato C; si primò, signum est perpendi-
 culum intra triangulum cadere, ut in fig. 38, an-
 gulum A esse acutum, & segmentum EB addi
 debere segmento AE ut proveniat latus AB;
 si se-

si secundùm, perpendicularum cadere extra, ut in fig. 40, angulum A esse obtusum & segmentum EA detrahi debere ab BE ut habeatur latus AB. Quod si angulus B sit obtusus, & C acutus, tunc perpendicularum ducatur ex angulo B in latus oppositum AC, cæteraque dic ut antea. Secundus casus est, si ambo anguli dati sint obtusi; tunc speciem tertii anguli A notam esse debere oportet, ut cognoscatur utrum intus vel extra cadat perpendicularum, & reliqua determinentur. Eodem pacto quo supra diximus (§. 7) quatuor hi casus *semidubii* appellari merentur.

E X E M P L U M.

Datâ poli elevatione PR $40^{\circ} 50'$ una cum Fig. 42
loco solis G $14^{\circ} 23' 8''$, & obliquitate
eclipticæ $23^{\circ} 29'$, invenire pun-
ctum eclipticæ oriens S ad datam
horam decimam matutinam

Si duæ horæ, residuum nempe horarum data-
rum ad meridiem, convertantur in gradus æqua-
toris, habebimus arcus AN $30^{\circ} 4' 36''$, cujus
complementum ad quadrantem est arcus NO 59°
 $55' 4''$. Ex dato loco solis per exemplum
(§. 62) inveniatur ejusdem

ascensio recta; nempe	L.S.CO	9. 4922738	
arcus CN $41^{\circ} 54' 45''$;	L.S.COR	8. 8788748	
auferatur CN ex NO,	Sum.cor.	8. 3721486	L.S.C
remanet CO $18^{\circ} 0' 19''$.			

Datis proinde in triangu-
lo CSO angulis SCO & COS, quorum unus obliqui-
tati eclipticæ, alter elevationi æquatoris sive com-
plemento elevationis potius est æqualis, ducto prius
perpendiculo CR, invenietur angulus OCR 41°

K 2

15

$$\begin{array}{r}
 \text{L. Cof. CO} \quad 9.9781933 \\
 \text{R.L.Cot.COR} \quad 623895 \\
 \hline
 \text{Sum.} \quad 10.0415828 \quad \text{L.Cot.OCR}
 \end{array}$$

$$\begin{array}{r}
 \text{L. Cof. RCS.} \quad 9.9762485 \quad \text{L.S.CS} \\
 \text{R.L.S.CR} \quad 684 \\
 \hline
 \text{Sum.} \quad 9.9763169
 \end{array}$$

$15^{\circ} 47''$ major scilicet angulo
 $\text{OCS } 23^{\circ} 29'$, unde perpendi-
 culum cadet extra, & horum
 angulorum differentia est angu-
 lus $\text{RCS } 18^{\circ} 46' 37''$, cujus be-
 neficio post inventum perpen-
 diculum $\text{CR } 1^{\circ} 21'$, habetur
 arcus quaesitus $\text{CS } 18^{\circ} 45'$,
 qui Eclipticae punctum oriens
 demonstrat.

PROBLEMA V.

Fig. 38 Datis tribus lateribus $\text{AB } 66^{\circ} 45'$, $\text{AC } 65^{\circ} 30' 48''$, $\text{BC } 59^{\circ} 29'$ invenire angulum quemlibet.

Fig. 38

$$\begin{array}{r}
 \text{L.Cof.BC.} \quad 9.7912754 \\
 \text{R.L.Cof.CE} \quad 205407 \\
 \hline
 \text{Sum.} \quad 9.8118161 \quad \text{L.Cof.BE}
 \end{array}$$

§. 74. In triangulo obliquangulo latus unum
 quadrans esse potest; reliquorum verò quodlibet
 necessarid quadrante majus aut minus esse
 debet; si enim aliquod ex his quadrans esset,
 jam triangulum foret rectangulum (§. 18) con-
 tra hyp. Sit igitur AB quadrans & angulus A
 inveniendus: Latus AC si minor est quadran-
 te producat ad E usque dum AE sit quadrans;
 si verò majus, ab AC abscindatur AD quadrans; in
 utroque casu ductus intel-
 ligatur arcus BE vel BD
 ex polo B qui erit men-
 sura anguli A , & facile
 innotescet ex datis BC , &
 CE vel CD differentiâ lateris dati & quadran-
 tis in rectangulo BCE , vel excessus supra qua-
 drautem in DBC . Sit $\text{BC } 51^{\circ} 48'$ & $\text{AC } 72^{\circ} 31'$,
 erit $\text{CE } 17^{\circ} 29'$, unde invenietur BE , hoc
 est arcus A quaesitus $49^{\circ} 34' 56''$ (§. 65).
 Si vero nullum latus quadrans sit, sed duo
 saly

saltem æqualia, patet faciliorem adhuc dari solutionem: divisa enim basi bifariam in F , arcus BF est perpendicularis (§.31) & dividet triangulum in duo rectangula æqualia, in quibus latera data sunt.

Quod si denique datum triangulum fuerit scalenum, in quo nullum latus est quadrans, fiat sequens analogia, ut rectangulum sub sinibus laterum angulum quæsitum comprehendentium ad quadratum radii, ita rectangulum sub sinu semisummæ arcus compositi ex basi & differentiâ laterum, & sub sinu arcus semidifferentiæ eorundem, ad quadratum dimidii anguli quæsitii (§.67); quum primi tres termini noti sint, quartus quoque innotescet. Log-mis autem adhibitis fiat summa ex log-mo duplo radii, log-mo sinus semisummæ arcus compositi ex basi & differentiâ laterum, log-mo sinus semidifferentiæ ejusdem arcus; qua si

dematur summa log-rum	L.S. AB	9.9632298	
sinuum laterum, remanet duplus log-mus	L.S. AC	9.9596699	
sinus anguli dimidii quæsitii; cujus tandem log-mi dimidium dat in	Sum.	19.9222867	L.S. AB, in AC
Tab. sinum dimidii anguli quæsitii. Sit in nostro	L.S. 20° 21' 36"	9.5414764	
exemplo inveniendus angulus A; differentia laterum AC AB angulum quæsitum comprehendentium	L.S. 19° 7' 24"	9.5153474	
est 1° 14' 12"; hujus summa, & basis BC est 40° 43' 12"; differentia illius & basis 38° 14' 48"	L.dup.R.	20.0000000	
per consequens semisumma	Sum.	39.0568238	Fig. 38
	R.L.S. AB in AC	777133	
	Sum.	19.1345371	dem. L.d.R
	Dim.	9.5672686	S.Dim. An. A

150
 ma $20^{\circ} 21' 36''$, & semidifferentia $19^{\circ} 7' 24''$; hisce arcibus in Tab. inveniuntur correspondentes log mi, qui addantur duplo log-mo radii, & fiat summa, a qua dempta summa log-rum sinuum laterum AC AB in Tab. inventorum, remanet log mus, cujus dimidium est log mus dimidii anguli quæsit, cui correspondent in Tab. $21^{\circ} 40'$; ac proinde angulus quæsitus A est $43^{\circ} 20'$, prorsus ut supra.

S C H O L I O N.

§. 75. *Methodus hæc resolvendi obliquangulum scalenum eâ potissimum commendari meretur ratione, quod angulos ut determinentur, specie notos haud habere sit necesse: cujuslibet enim obtusi dimidium, quomodolibet magni supponatur, semper est acutus. Non semper enim ex datis tribus lateribus angulorum affectiones dignoscuntur, ut falsè sibi persuasit Dechales in suo illo problemate Datis tribus lateribus trianguli sphærici, cognoscere cujus affectionis sit angulus quilibet; sistem is author minime demonstravit in casu obliquanguli scaleni, in quo tria latera sunt quadrante minora quomodo angulus aliquis cognoscatur utrum obtusus, qui adesse & abesse potest, vel acutus sit.*

E X E M P L U M.

Fig. 44 Data duarum fixarum S & T distantia TS $18^{\circ} 51' 48''$, latitudine Boreali SH $9^{\circ} 36' 30''$ & IT $27^{\circ} 47' 10''$ invenire differentiam longitudinum HI.

In triangulo SPT datum est latus ST, item
 la.

latus $SP\ 80^{\circ}\ 3'\ 30''$,
 $TP\ 62^{\circ}\ 12'\ 50''$, facile igitur invenietur
 angulus $\angle P$, hęc est
 arcus $H\ 16^{\circ}\ 30'$ lon-
 gitudinum $Al\ AH$ dif-
 ferentia.

L.S.SP. 9.9934252

L.S.TP. 9.9467931

Sum. 19.9402223. L.S.SP in PT

L.S. $18^{\circ}\ 21'\ 14''$ 9.4981525

L.S. $0^{\circ}\ 30'\ 44''$ 7.9489002

L.dup. R. 20.0000000

Sum. 37.4470527

R.L.d.R.S.SP in PT 597777

Sum. 17.5068304 dem.L.d.R

Dim. 8.7534152 L.S.dim.An.P

P R O B L E M A VI.

Datis tribus angulis $A\ 43^{\circ}\ 20'$, $C\ 82\ 34'\ 4''$ Fig. 38

$B\ 79^{\circ}\ 9'\ 59''$ invenire latus quodlibet.

§.76. Ut hoc problema resolvatur novum trian-
 gulum construi debet, in quo latera vicem subeant
 angulorum in primo triangulo datorum (§.69) quo
 facto manifestum est hoc Problema idem esse cum
 præcedenti. Sit in nostro exemplo inveniendum
 latus AB ; novum triangulum imaginetur abc
 per (§.69) constructum, in quo erit latus unum
 $cb\ 136^{\circ}\ 40'$, $ac\ 100^{\circ}\ 50'\ 1''$, $ab\ 97^{\circ}\ 25'\ 36''$,
 supplementa scilicet datorum angulorum
 in primo triangulo ad semicirculum: angulus

Fig. 41

ergo c , qui opposi-
 tus est lateri ab ,
 sive supplemento
 anguli C in altero
 triangulo, referet
 supplementum ad
 semicirculum la-
 lateris quæsitæ AB .

L.S. ac 9.9921898

L.S. bc 9.8364771

Sum. 19.8286669 L.S. ac in bc

Da-

$$\begin{array}{r}
 152 \\
 \text{L. S. } 66^\circ 37' 57'' \quad 9.9628331 \\
 \text{L. S. } 30^\circ 47' 58'' \quad 9.7092992 \\
 \text{L. dup. R.} \quad 20.0000000 \\
 \hline
 \text{Sum} \quad 39.6721323 \\
 \text{R.L.S. ac in } bc \quad 1713331
 \end{array}$$

Sum. 19.8434654 Dem.L.d.R
Dim. 9.9217327 S.Dim.An.c

bc est $35^\circ 49' 59''$, summa hujus & basis ab est $133^\circ 15' 55''$; differentia illius & basis est $61^\circ 35' 57''$, ac proinde semisumma $66^\circ 37' 57''$, & semidifferentia $30^\circ 47' 58''$, cætera fac ut antea; & invenies angulum c $113^\circ 15'$, cujus supplementum ad semicirculum $66^\circ 45'$ exhibet latus quæsitum AB prorsus ut supra. Nullo hoc problema sensibili exemplo indiget, quum idem sit ac præcedens.

Datis proinde in triangulo abc tribus lateribus inveniat per Probl. præc. angulus c hoc modo. Differ-

S C H O L I O N.

§. 77. Habent igitur Studiosi casuum omnium triangulorum obliquangulorum, quam promiseram, resolutionem; ubi iisdem quantitatibus angulos vel latera denotantibus usi sumus, ut diversæ methodus, qua idem assequatur, consensum prodiret. Ex. gr. In casu 2^o Probl. I invenimus angulum C $82^\circ 34''$; in 3^o Probl. II $82^\circ 34' 6''$; in 1^o Probl. III $82^\circ 34' 7''$. Ita in casu 2^o Probl. I invenietur latus AB $66^\circ 44' 59''$, at in Probl. VI $66^\circ 45'$; in quibus omnibus casibus tantum paucorum secundorum differentia observatur, quæ tamen in quibusdam aliis casibus etiam paulo major esse potest; sed hac quidem præcisione contenti abire possumus; quum discreta numerica quantitatis natura Geometricæ exactitudinem non admittat, ut (§. 37 57 lib 1) jam olim advertimus.

F I N I S.

T A B U L Æ

LOG-RUM NUMERORUM NATURALIUM

ab 1 ad 10000,

Necnon SINUM ET TANGENTIUM

Ad Radium 10.0000000

Nu.	Log.	Nu.	Log.	Nu.	Log.	Nu.	Log.
1	0.0000000	26	1.4149733	51	1.7075702	76	1.4808136
2	0.3010300	27	1.4313638	52	1.7160033	77	1.8864907
3	0.4771212	28	1.4471580	53	1.7242759	78	1.8920946
4	0.6020600	29	1.4623980	54	1.7323937	79	1.8976271
5	0.6989700	30	1.4771212	55	1.7403627	80	1.9030900
6	0.7781512	31	1.4913617	56	1.7481880	81	1.9084850
7	0.8450980	32	1.5051500	57	1.7558748	82	1.9138138
8	0.9030900	33	1.5185139	58	1.7634280	83	1.9190781
9	0.9542425	34	1.5314789	59	1.7708520	84	1.9242793
10	1.0000000	35	1.5440680	60	1.7781512	85	1.9294189
11	1.0413927	36	1.5563025	61	1.7853298	86	1.9344984
12	1.0791812	37	1.5682017	62	1.7923917	87	1.9395192
13	1.1139433	38	1.5797836	63	1.7993405	88	1.9444827
14	1.1461280	39	1.5910646	64	1.8061800	89	1.9493900
15	1.1760913	40	1.6020600	65	1.8129133	90	1.9542425
16	1.2041200	41	1.6127839	66	1.8195439	91	1.9590414
17	1.2304489	42	1.6232493	67	1.8260748	92	1.9637878
18	1.2552725	43	1.6334685	68	1.8325089	93	1.9684829
19	1.2787536	44	1.6434527	69	1.8388491	94	1.9731278
20	1.3010300	45	1.6532125	70	1.8450980	95	1.9777236
21	1.3222193	46	1.6627578	71	1.8512583	96	1.9822712
22	1.3424227	47	1.6720979	72	1.8573325	97	1.9867717
23	1.3617278	48	1.6812412	73	1.8633229	98	1.9912261
24	1.3802112	49	1.6901951	74	1.8692317	99	1.9956352
25	1.3979400	50	1.6989700	75	1.8750613	100	2.0000000

Nu.	0	1	2	3	4
100	0000000	0004341	0008677	0013009	0017337
101	0043214	0047511	0051805	0056094	0060379
102	0086002	0090257	0094509	0098756	0102999
103	0128372	0132587	0136794	0141003	0145205
104	0170133	0174507	0178677	0182843	0187005
105	0211893	0216027	0220157	0224284	0228406
106	0253059	0257154	0261245	0265333	0269416
107	0293828	0297895	0301948	0305997	0310043
108	0334239	0338257	0342273	0346284	0350293
109	0374265	0378247	0382226	0386202	0390173
110	0413927	0417873	0421816	0425755	0429691
111	0453220	0457140	0461048	0464952	0468852
112	0492180	0496056	0499928	0503797	0507663
113	0530784	0534626	0538464	0542299	0546130
114	0569048	0572856	0576661	0580462	0584268
115	0606978	0610753	0614525	0618293	0622058
116	0644580	0648322	0652061	0655797	0659530
117	0681859	0685569	0689276	0692980	0696681
118	0718820	0722499	0726175	0729847	0733517
119	0755470	0759118	0762762	0766404	0770043
120	0791812	0795430	0799045	0802656	0806265
121	0827854	0831441	0835026	0838608	0842187
122	0863598	0867157	0870712	0874264	0877814
123	0899051	0902580	0906107	0909631	0913151
124	0934217	0937718	0941216	0944711	0948204
125	0969100	0972573	0976043	0979511	0982975
126	1003705	1007151	1010593	1014033	1017471
127	1038037	1041455	1044871	1048284	1051694
128	1072100	1075491	1078880	1082266	1085650
129	1105897	1109262	1112625	1115985	1119343
130	1139433	1142773	1146110	1149444	1152776
131	1172713	1176027	1179338	1182647	1185954
132	1205739	1209028	1212314	1215598	1218880
133	1238516	1241780	1245042	1248301	1251558
134	1271048	1274288	1277525	1280760	1283993
135	1303338	1306553	1309767	1312978	1316187
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0149403	0153597	0157787	0161973	0166155	4198
0191163	0195317	0199467	0203613	0207755	4158
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0273496	0277572	0281644	0285712	0289777	4080
0314185	0318123	0322157	0326188	0330214	4042
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0394141	0398105	0402066	0406023	0409977	3968
0433622	0437551	0441476	0445398	0449315	3932
0472749	0476642	0480532	0484418	0488301	3897
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0549958	0553783	0557604	0561423	0565237	3828
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0773679	0777312	0780941	0784568	0788192	3636
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0951693	0955180	0958664	0962146	0965624	3489
09866437	0989896	0993357	0996806	1000257	3462
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1055102	1058517	1061909	1065308	1068705	3408
1089031	1092410	1095785	1099159	1102529	3381
1122698	1126050	1129400	1132747	1136091	3355
1156105	1159432	1162756	1166077	1169396	3329
1189257	1192559	1195858	1199154	1202448	3303
1222159	1225425	1228709	1231981	1235250	3279
1254813	1258064	1261314	1264561	1267806	3255
1287223	1290450	1293676	1296899	1300119	3230
1319393	1322597	1325798	1328998	1332195	3204
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140	1461280	1464381	1467483	1470577	1473671
141	1492191	1495270	1498347	1501422	1504494
142	1522883	1525941	1528996	1532049	1535100
143	1553360	1556396	1559430	1562452	1565491
144	1583625	1586640	1589653	1592662	1595672
145	1613680	1616674	1619666	1622656	1625644
146	1643528	1646502	1649474	1652442	1655411
147	1673173	1676127	1679078	1682027	1684975
148	1702617	1705550	1708482	1711411	1714339
149	1731863	1734776	1737688	1740598	1743506
150	1760913	1763807	1766699	1769590	1772478
151	1780769	1792645	179558	1798389	1801259
152	1818437	1821292	1824146	1826997	1829850
153	1846914	1849752	1852588	1855421	1858253
154	1875207	1878026	1880844	1883659	1886473
155	1903317	1906118	1908917	1911714	1914510
156	1931246	1934029	1936810	1939590	1942367
157	1958996	1961761	1964525	1967287	1970047
158	1986571	1989319	1992065	1994809	1997552
159	2013671	2016702	2019431	2022158	2024883
160	2041200	2043913	2046625	2049335	2052044
161	2068259	2070955	2073650	2076344	2079035
162	2095150	2097830	2100508	2103185	2105860
163	2121876	2124540	2127201	2129862	2132521
164	2148438	2151086	2153732	2156376	2159018
165	2174839	2177471	2180100	2182728	2185355
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167	2227165	2229764	2232363	2234959	2237555
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171	2329961	2332500	2335038	2337574	2340108
172	2355284	2357809	2360331	2362852	2365373
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1517564	1510632	1513698	1516762	1519824	3070
1538149	1541195	1544240	1547282	1550322	3046
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1717264	1720188	1723110	1726029	1728947	2925
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1889285	1892095	1894903	1897709	1900514	2812
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1945143	1947917	1950690	1953460	1956229	2776
1972806	1975562	1978317	1981070	1983821	2759
2000293	2003032	2005769	2008505	2011239	2741
2027607	2030329	2033049	2035768	2038485	2724
2054750	2057455	2060159	2062869	2065560	2706
2081725	2084413	2087100	2089785	2092468	2690
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2135178	2137833	2140487	2143139	2145789	2657
2161659	2164298	2166936	2169572	2172206	2641
2187980	2190603	2193225	2195845	2198464	2625
2214142	2216750	2219356	2221960	2224563	2609
2240148	2242740	2245331	2247920	2250507	2694
2265999	2268576	2271151	2273724	2276296	2578
2291697	2294258	2296818	2299377	2301934	2563
2317244	2319790	2322335	2324879	2327421	2548
2342641	2345173	2347703	2350232	2352759	2533
2367891	2370408	2372923	2375437	2377950	2518
2392995	2395497	2397998	2400498	2402996	2504
2417954	2420442	2422929	2425414	2427898	2489
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180	2552725	2555137	2557548	2559957	2562365
181	2576786	2579184	2581582	2583978	2586373
182	2600714	2603099	2605484	2607867	2610248
183	2624511	2626883	2629255	2631625	2633993
184	2648178	2650538	2652896	2655253	2657609
185	2671717	2674064	2676410	2678754	2681097
186	2695129	2697464	2699797	2702128	2704459
187	2718416	2720738	2723058	2725378	2727696
188	2741578	2743888	2746196	2748503	2750809
189	2764618	2766915	2769211	2771506	2773800
190	2787536	2789821	2792105	2794388	2796669
191	2810334	2812607	2814879	2817150	2819419
192	2833012	2835274	2837534	2839793	2842051
193	2855573	2857823	2860071	2862318	2864565
194	2878017	2880255	2882492	2884728	2886963
195	2900346	2902573	2904798	2907022	2909246
196	2922561	2924776	2926990	2929203	2931415
197	2944662	2946866	2949069	2951271	2953471
198	2966652	2968845	2971036	2973227	2975417
199	2988531	2990713	2992893	2995073	2997251
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202	3053514	3055663	3057811	3059959	3062105
203	3074960	3077099	3079237	3081374	3083509
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210	3222193	3224260	3226327	3228393	3230457
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2933626	2935835	2938044	2940251	2942457	2211
2955671	2957869	2960067	2962263	2964458	2200
2977605	2979792	2981979	2984164	2986348	2188
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3211840	3213913	3215984	3218055	3220124	2073
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3253104	3255157	3257209	3259260	3261310	2054
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216	3344537	3346548	3348557	3350565	3352572
217	3364697	3366698	3368698	3370697	3372695
218	3384865	3386857	3388847	3390837	3392826
219	3404441	3406424	3408405	3410386	3412366
220	3424227	3426200	3428173	3430145	3432116
221	3443923	3445887	3447851	3449814	3451776
222	3463530	3465486	3467441	3469395	3471348
223	3483049	3484996	3486942	3488887	3490832
224	3502480	3504419	3506356	3508293	3510228
225	3521825	3523755	3525684	3527612	3529539
226	3541084	3543006	3544926	3546845	3548764
227	3560259	3562171	3564082	3565994	3567905
228	3579348	3581253	3583156	3585059	3586961
229	3598355	3600251	3602146	3604040	3605934
230	3617278	3619166	3621053	3622939	3624825
231	3636120	3638000	3639878	3641756	3643633
232	3654880	3656751	3658622	3660492	3662361
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235	3710679	3712526	3714373	3716219	3718065
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237	3747483	3749316	3751147	3752977	3754807
238	3765769	3767594	3769418	3771240	3773062
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241	3820170	3821972	3823773	3825573	3827373
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3394514	3396501	3398488	3400473	3402458	1988
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3512163	3514098	3516031	3517963	3519895	1934
3531465	3533391	3535316	3537239	3539162	1926
3550682	3552599	3554515	3556430	3558345	1918
3569813	3571723	3573630	3575537	3577443	1908
3588862	3590762	3592662	3594560	3596458	1901
3607827	3609719	3611610	3613508	3615390	1893
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3645510	3647386	3649260	3651134	3653007	1877
3664230	3666097	3667964	3669830	3671695	1869
3682869	3684728	3686587	3688445	3690302	1861
3701428	3703280	3705131	3706981	3708830	1852
3719909	3721753	3723596	3725438	3727279	1844
3738311	3740147	3741983	3743817	3745651	1836
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3774884	3776704	3778524	3780343	3782161	1822
3793055	3794868	3796680	3798492	3800302	1814
3811151	3812956	3814761	3816565	3818368	1806
3829171	3830969	3832766	3834563	3836359	1798
3847117	3848908	3850698	3852487	3854275	1791
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254	4028327	4030047	4031755	4033464	4035171
255	4035402	4037105	4038807	4040508	4042209
256	4042400	4044096	4045791	4047486	4049180
257	4049231	4101021	4102710	4104398	4106085
258	4116157	4117880	4119562	4121244	4122925
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263	4199557	4201208	4202850	4204509	4206158
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265	4222459	4224097	4225735	4227372	4229009
266	4248816	4250449	4252080	4253712	4255342
267	4265112	4266739	4268365	4269990	4271612
268	4281328	4282968	4284583	4286207	4287825
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272	4345689	4347285	4348881	4350476	4352071
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274	4377506	4379090	4380674	4382258	4383841
275	4393327	4394906	4396483	4398062	4399629
276	4409091	4410664	4412237	4413809	4415380
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279	4456042	4457598	4459154	4460709	4462262
280	4471580	4473131	4474681	4476231	4477780
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4158077	4159744	4161410	4163076	4164741	1667
4174717	4176377	4178037	4179696	4181355	1661
4191293	4192947	4194601	4196254	4197906	1655
4207806	4209454	4211101	4212748	4214394	1648
4224257	4225898	4227539	4229180	4230820	1643
4240645	4242281	4243915	4245550	4247183	1636
4256972	4258601	4260230	4261858	4263486	1630
4273238	4274861	4276484	4278106	4279727	1624
4289442	4291060	4292677	4294292	4295908	1618
4305588	4307199	4308809	4310419	4312029	2612
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4337698	4339298	4340896	4342494	4344092	1600
4353665	4355258	4356851	4358444	4360035	1594
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4432630	4434195	4435759	4437322	4438885	1565
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4556061	4557582	4559102	4560622	4562142	1521
4571246	4572762	4574277	4575791	4577305	1515
4586378	4587889	4589399	4590908	4592417	1510
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292	4652828	4655316	4656803	4658288	4659774
293	46686-6	4670158	4671647	4673120	46-4601
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295	4698220	4699692	4701163	4702634	4704105
296	4712917	4714384	4715850	4717317	4718782
297	4727563	4729027	4730488	4731949	4733410
298	4742163	4743620	4745076	4746533	4747988
299	4756712	4758164	4759616	4761067	4762518
300	4771212	4772660	4774107	4775552	4776999
301	4785665	4787108	4788550	4789991	4791433
302	4800069	4801507	4802945	4804381	4805818
303	4814426	4815859	4817292	4818726	4820156
304	4828726	4830164	4831592	4833019	4834446
305	4842998	4844422	4845845	4847268	4848690
306	4857214	4858633	4860052	4861570	4862888
307	4871264	4872798	4874212	4875626	4877039
308	4885557	4886917	4888326	4889735	4891144
309	4899585	4900990	4902395	4903799	4905208
310	4913617	4915018	4916418	4917818	4919217
311	4927604	4929000	4930396	4931791	4933185
312	4941546	4942938	4944329	4945720	4947110
313	4955443	4956831	4958218	4959604	4960990
314	4969296	49-0679	4972062	4973444	4974825
315	4983106	4984484	4985862	4987240	4988617
316	4996871	4998245	4999619	5000992	5002365
317	5010593	5011962	5013332	5014701	5016069
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320	5051500	5052857	5054213	5055569	5056925
321	5065050	5066403	5067755	5069107	5070459
322	5078559	5079907	5081255	5082603	5083950
323	5092025	5093370	5094713	5096057	5097400
324	5105450	5106790	5108130	5109469	5110808
325	5118834	5120170	5121509	5122841	5124175
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335	5250428	5251744	5253040	5254235	5255621
336	5263393	5264685	5265977	5267269	5268569
337	5276299	5277588	5278876	5280163	5281451
338	5289167	5290452	5291736	5293020	5294302
339	5301997	5303278	5304558	5305829	5307118
340	5314789	5316066	5317343	5318619	5319895
341	5327544	5328817	5330090	5331362	5332635
342	5340261	5341531	5342800	5344059	5345328
343	5352941	5354207	5355472	5356728	5358003
344	5365584	5366847	5368109	5369370	5370631
345	5378191	5379450	5380708	5381966	5383222
346	5390761	5392016	5393271	5394525	5395779
347	5403295	5404546	5405797	5407048	5408298
348	5415792	5417040	5418288	5419523	5420781
349	5428254	5429519	5430742	5431986	5433229
350	5440680	5441921	5443161	5444401	5445641
351	5453071	5454308	5455545	5456785	5458017
352	5465427	5466660	5467894	5469126	5470359
353	5477747	5478977	5480207	5481436	5482665
354	5490023	5491259	5492486	5493712	5494937
355	5502283	5503507	5504730	5505952	5507174
356	5514500	5515720	5516929	5518158	5519377
357	5526682	5527898	5529114	5530330	5531545
358	5538830	5540042	5541256	5542468	5543680
359	5550944	5552154	5553362	5554572	5555781
360	5562025	5563231	5564437	5565642	5566848
361	5575772	5576275	5577477	5578680	5579881
362	5587086	5588285	5589484	5590683	5591882
363	5599066	5600262	5601458	5602654	5603849
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5384481	5385737	5386994	5388250	5389506	1258
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369	5670264	5671440	5672617	5673793	5674969
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371	5692739	5694910	5696080	5697249	5698419
372	5705429	5706597	5707764	5708930	5710097
373	5717088	5718252	5719416	5720580	5721743
374	5728716	5729877	5731038	5732198	5733358
375	5740313	5741471	5742628	5743786	5744943
376	5751878	5753033	5754188	5755342	5756496
377	5763413	5764565	5765717	5766868	5768019
378	5774917	5776067	5777215	5778362	5779511
379	5786292	5787538	5788683	5789828	5790973
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382	5820634	5821770	5822907	5824042	5825179
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386	5865873	5866998	5868123	5869247	5870371
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391	5921768	5922878	5923988	5925098	5926208
392	5932861	5933968	5935076	5936183	5937290
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394	5954962	5956064	5957166	5958268	5959369
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396	5976952	5978048	5979145	5980241	5981336
397	5987905	5988999	5990092	5991186	5992279
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5837654	5838786	5839918	5841050	5842181	1133
5848963	5850093	5851222	5852351	5853479	1129
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407	6095944	6097011	6098078	6099144	6100210
408	6106602	6107666	6108730	6109794	6110857
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413	6169501	6160552	6161603	6162654	6163705
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415	6180481	6181527	6182573	6183619	6184665
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448	6512780	6513749	6514719	6515687	6516656
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458	6608665	6609603	6610551	6611499	6612446
459	6618127	6619073	6620019	6620964	6621910
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463	6655810	6656748	6657685	6658623	6659560
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476	6776069	6776982	6777894	6778806	6779718
477	6785184	6786094	6787004	6787914	6788824
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6594428	6595379	6596321	6597261	6598212	952
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537	7299742	7300551	7301360	7302168	7302977
538	7307822	7308630	7309437	7310244	7311051
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540	7323938	7324742	7325546	7326350	7327153
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542	7339992	7340794	7341595	7342396	7343197
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544	7355989	7356787	7357585	7358383	7359181
545	7363965	7364762	7365558	7366355	7367151
546	7371926	7372722	7373517	7374312	7375107
547	7379872	7380667	7381461	7382254	7383048
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7375902	7376696	7377491	7378285	7379079	795
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566	7528164	7528932	7529697	7530466	7531232
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573	7581546	7582304	7583062	7583819	7584577
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7577755	7578513	7579272	7580030	7580788	759
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7892251	7892986	7893691	7894397	7895102	706
7899331	7900035	7900739	7901444	7902148	705
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636	8034571	8035254	8035937	8036619	8037302
637	8041394	8042076	8042758	8043439	8044121
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652	8142476	8143142	8143808	8144474	8145140
653	8149132	8149797	8150462	8151127	8151791
654	8155777	8156441	8157105	8157769	8158433
655	8162313	8162976	8163639	8164302	8164964
656	8169038	8169700	8170362	8171024	8171686
657	8175654	8176315	8176976	8177636	8178297
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675	8292038	8292681	8293324	8293967	8294611
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683	8344207	8344842	8345479	8346114	8346750
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716	8549130	8549737	8550343	8550949	8551556
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720	8573225	8573928	8574531	8575134	8575737
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723	8591383	8591984	8592584	8593186	8593785
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725	8603380	8603979	8604578	8605177	8605776
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788	8965262	8965813	8966364	8966915	8967466
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805	9057960	9058498	9059038	9059577	9060116
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807	9068735	9069273	9069812	9070350	9070887
808	9074114	9074651	9075188	9075726	9076263
809	9079485	9080022	9080559	9081095	9081632
810	9084850	9085386	9085922	9086458	9086994
811	9090209	9090744	9091279	9091815	9092350
812	9095560	9096095	9096630	9097165	9097699
813	9100905	9101440	9101974	9102508	9103042
814	9106244	9106778	9107311	9107844	9108378
815	9111576	9112109	9112642	9113174	9113707
816	9116902	9117434	9117966	9118498	9119030
817	9122220	9122752	9123284	9123815	9124346
818	9127533	9128064	9128595	9129126	9129656
819	9132839	9133369	9133899	9134430	9134960
820	9138139	9138668	9139198	9139727	9140257
821	9143432	9143961	9144489	9145018	9145547

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9000939	9001486	9002032	9002579	9003125	547
9006402	9006948	9007494	9008039	9008585	546
9011858	9012403	9012948	9013493	9014038	545
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9022549	9023092	9023637	9024181	9024724	544
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9039025	9039577	9040119	9040661	9041202	542
9044430	9044992	9045533	9046073	9046615	541
9049859	9050399	9050940	9051480	9052020	541
9055261	9055800	9056340	9056880	9057419	540
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9135490	9136019	9136549	9137079	9137609	520
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825	9164539	9165066	9165592	9166118	9166645
826	9169800	9170326	9170852	9171378	9171903
827	9175055	9175580	9176105	9176630	9177155
828	9180303	9180828	9181352	9181877	9182401
829	9185545	9186069	9186593	9187117	9187640
830	9190781	9191304	9191827	9192350	9192873
831	9196010	9196532	9197055	9197578	9198100
832	9201233	9201755	9202277	9202799	9203321
833	9206450	9206971	9207493	9208014	9208535
834	9211661	9212181	9212702	9213222	9213743
835	9216865	9217385	9217905	9218425	9218945
836	9222063	9222582	9223102	9223621	9224140
837	9227255	9227772	9228292	9228811	9229330
838	9232440	9232958	9233477	9233995	9234513
839	9237620	9238137	9238655	9239172	9239690
840	9242793	9243310	9243827	9244344	9244860
841	9247960	9248476	9248993	9249509	9250025
842	9253121	9253637	9254152	9254668	9255184
843	9258276	9258791	9259306	9259821	9260336
844	9263424	9263939	9264452	9264968	9265482
845	9268567	9269081	9269595	9270109	9270622
846	9273704	9274217	9274730	9275242	9275757
847	9278834	9279347	9279859	9280372	9280885
848	9283959	9284471	9284983	9285495	9286007
849	9289077	9289588	9290100	9290611	9291123
850	9294189	9294700	9295211	9295722	9296233
851	9299296	9299806	9300316	9300826	9301336
852	9304396	9304906	9305415	9305925	9306434
853	9309490	9309999	9310508	9311017	9311526
854	9314579	9315087	9315596	9316104	9316612
855	9319661	9320169	9320677	9321185	9321692
856	9324728	9325235	9325752	9326259	9326767
857	9329808	9330315	9330822	9331328	9331835
858	9334873	9335379	9335885	9336391	9336897
859	9339932	9340437	9340943	9341544	9341953

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9161907	9162433	9162960	9163487	9164013	527
9167171	9167697	9168223	9168749	9169275	526
9172429	9172954	9173479	9174005	9174530	526
9177680	9178205	9178730	9179254	9179779	525
9182925	9183449	9183973	9184497	9185021	524
9188164	9188687	9189211	9189734	9190258	524
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9235031	9235549	9236066	9236584	9237102	518
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9265997	9266511	9267025	9267539	9268053	515
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9291634	9292145	9292656	9293167	9293678	511
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9332341	9332848	9333354	9333860	9334367	506
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863	9360108	9360611	9361114	9361617	9362120
864	9365137	9365640	9366143	9366645	9367148
865	9370161	9370663	9371165	9371667	9372169
866	9375179	9375680	9376182	9376683	9377184
867	9380191	9380692	9381192	9381692	9382194
868	9385197	9385697	9386198	9386698	9387198
869	9390198	9390697	9391197	9391697	9392196
870	9395192	9395692	9396191	9396690	9397189
871	9400182	9400680	9401179	9401677	9402176
872	9405165	9405663	9406161	9406659	9407157
873	9410142	9410640	9411137	9411635	9412132
874	9415114	9415611	9416108	9416605	9417101
875	9420081	9420577	9421073	9421569	9422065
876	9425041	9425537	9426032	9426528	9427024
877	9429996	9430491	9430986	9431481	9431976
878	9434945	9435440	9435934	9436429	9436923
879	9439889	9440382	9440877	9441371	9441865
880	9444827	9445320	9445814	9446307	9446800
881	9449759	9450252	9450745	9451238	9451730
882	9454686	9455178	9455671	9456163	9456655
883	9459607	9460099	9460591	9461082	9461574
884	9464523	9465014	9465505	9465996	9466487
885	9469433	9469923	9470414	9470905	9471395
886	9474337	9474827	9475317	9475807	9476297
887	9479236	9479726	9480215	9480705	9481194
888	9484130	9484619	9485108	9485597	9486085
889	9489018	9489506	9489994	9490483	9490971
890	9493900	9494388	9494876	9495364	9495852
891	9498777	9499264	9499752	9500239	9500726
892	9503649	9504135	9504622	9505109	9505596
893	9508515	9509001	9509487	9509973	9510459
894	9513375	9513861	9514347	9514832	9515318
895	9518220	9518706	9519191	9519676	9520161
896	9523080	9523565	9524049	9524534	9525018
897	9527924	9528409	9528893	9529377	9529861

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9367650	9368152	9368655	9369157	9369659	502
9372671	9373172	9373674	9374176	9374677	502
9377685	9378187	9378688	9379189	9379690	502
9382695	9383195	9383696	9384196	9384697	501
9387698	9388198	9388698	9389198	9389698	500
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9397688	9398187	9398685	9399184	9399683	499
9402674	9403172	9403670	9404169	9404667	498
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9442458	9442852	9443346	9443840	9444333	494
9447494	9447787	9448280	9448773	9449266	494
9452223	9452716	9453208	9453701	9454193	493
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9471886	9472376	9472866	9473357	9473847	491
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9481684	9482173	9482662	9483151	9483641	490
9486574	9487062	9487552	9488040	9488529	489
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9496330	9496827	9497314	9497802	9498290	488
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9530345	9530828	9531312	9531796	9532280	484

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900	9542425	9542908	9543390	9543872	9544355
901	9547248	9547730	9548212	9548694	9549176
902	9552065	9552547	9553028	9553510	9553991
903	9556877	9557358	9557839	9558320	9558801
904	9561684	9562165	9562645	9563125	9563605
905	9566486	9566966	9567445	9567925	9568405
906	9571282	9571761	9572241	9572720	9573199
907	9576073	9576552	9577030	9577509	9577988
908	9580858	9581337	9581815	9582292	9582771
909	9585639	9586117	9586594	9587072	9587549
910	9590414	9590891	9591368	9591845	9592322
911	9595184	9595660	9596137	9596614	9597090
912	9599948	9600425	9600901	9601377	9601853
913	9604708	9605183	9605659	9606135	9606610
914	9609462	9609937	9610412	9610887	9611362
915	9614211	9614686	9615160	9615635	9616109
916	9618955	9619429	9619903	9620377	9620851
917	9623693	9624167	9624640	9625114	9625587
918	9628427	9628900	9629373	9629845	9630319
919	9633155	9633628	9634100	9634572	9635045
920	9637878	9638350	9638822	9639294	9639765
921	9642596	9643068	9643539	9644011	9644482
922	9647309	9647780	9648251	9648722	9649193
923	9652017	9652488	9652958	9653428	9653899
924	9656720	9657190	9657660	9658130	9658599
925	9661417	9661887	9662356	9662826	9663295
926	9666110	9666579	9667048	9667517	9667985
927	9670797	9671266	9671734	9672202	9672671
928	9675480	9675948	9676416	9676883	9677351
929	9680157	9680625	9681092	9681559	9682027
930	9684829	9685296	9685763	9686230	9686697
931	9689497	9689963	9690430	9690896	9691362
932	9694159	9694625	9695091	9695557	9696023
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9554472	9554953	9555434	9555915	9556397	481
9559282	9559762	9560243	9560723	9561204	481
9564086	9564566	9565046	9565526	9566006	480
9568885	9569364	9569844	9570323	9570803	480
9573678	9574157	9574636	9575115	9575594	479
9578466	9578945	9579423	9579902	9580380	479
9583249	9583727	9584205	9584683	9585161	478
9588027	9588505	9588982	9589459	9589937	478
9592799	9593276	9593753	9594230	9594707	477
9597567	9598043	9598520	9598996	9599472	477
9602329	9602805	9603280	9603756	9604232	476
9607086	9607561	9608036	9608511	9608987	476
9611837	9612312	9612787	9613261	9613736	475
9616583	9617058	9617532	9618006	9618481	475
9621325	9621799	9622272	9622746	9623220	474
9626061	9626534	9627007	9627481	9627954	474
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9687164	9687630	9688097	9688564	9689030	467
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939	9726656	9727118	9727581	9728043	9728506
940	9731288	9731741	9732202	9732664	9733126
941	9735896	9736358	9736819	9737281	9737742
942	9740509	9740970	9741431	9741892	9742353
943	9745117	9745577	9746038	9746498	9746959
944	9749720	9750180	9750640	9751100	9751560
945	9754318	9754778	9755237	9755697	9756156
946	9758911	9759370	9759829	9760288	9760747
947	9763500	9763958	9764417	9764875	9765334
948	9768083	9768541	9768999	9769457	9769915
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951	9781805	9782262	9782718	9783175	9783631
952	9786369	9786826	9787282	9787738	9788194
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954	9795484	9795939	9796394	9796849	9797304
955	9800024	9800488	9800943	9801398	9801852
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957	9809119	9809573	9810027	9810481	9810924
958	9813655	9814108	9814562	9815015	9815468
959	9818185	9818639	9819092	9819544	9819997
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961	9827234	9827686	9828138	9828589	9829041
962	9831751	9832202	9832654	9833105	9833556
963	9836263	9836714	9837165	9837616	9838066
964	9840770	9841222	9841671	9842122	9842572
965	9845273	9845723	9846173	9846623	9847073
966	9849771	9850221	9850670	9851120	9851569
967	9854265	9854714	9855163	9855612	9856061
968	9858754	9859202	9859651	9860099	9860548
969	9863238	9863686	9864134	9864582	9865030
970	9867717	9868165	9868613	9869060	9869508
971	9872192	9872640	9873087	9873534	9873981
972	9876662	9877109	9877556	9878002	9878449
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9719713	9720176	9720639	9721102	9721565	463
9724343	9724805	9725268	9725731	9726193	463
9728968	9729430	9729892	9730354	9730816	462
9733588	9734050	9734511	9734973	9735435	462
9738203	9738664	9739126	9739587	9740048	461
9742814	9743274	9743735	9744196	9744656	461
9747419	9747879	9748340	9748800	9749260	460
9752020	9752479	9752939	9753399	9753858	460
9756615	9757075	9757534	9757993	9758452	459
9761206	9761665	9762124	9762582	9763041	459
9765792	9766251	9766709	9767167	9767625	458
9770373	9770831	9771289	9771747	9772204	458
9774950	9775407	9775864	9776322	9776779	458
9779521	9779978	9780435	9780892	9781348	457
9784188	9784544	9785001	9785457	9785913	457
9788650	9789106	9789562	9790017	9790473	456
9793207	9793662	9794118	9794573	9795028	456
9797759	9798214	9798669	9799124	9799579	455
9802307	9802761	9803216	9803670	9804125	455
9806830	9807284	9807738	9808192	9808646	454
9811388	9811841	9812295	9812748	9813202	454
9815921	9816374	9816827	9817280	9817733	453
9820450	9820902	9821355	9821807	9822260	453
9824974	9825426	9825878	9826330	9826782	452
9829493	9829945	9830396	9830848	9831299	452
9834007	9834459	9834910	9835361	9835812	451
9838517	9838968	9839419	9839869	9840320	451
9843022	9843473	9843923	9844372	9844822	450
9847523	9847973	9848422	9848872	9849322	450
9852019	9852468	9852917	9853366	9853816	450
9856510	9856959	9857407	9857856	9858305	449
9860996	9861445	9861893	9862341	9862790	448
9865478	9865926	9866374	9866822	9867270	448
9869955	9870403	9870850	9871298	9871745	447
9874428	9874875	9875322	9875769	9876216	447
9878896	9879343	9879789	9880236	9880682	447
9883360	9883806	9884252	9884698	9885144	446

Nu.	0	1	2	3	4
974	9885590	9886035	9886481	9886927	9887373
975	9890046	9890492	9890937	9891382	9891828
976	9894498	9894943	9895388	9895833	9896278
977	9898946	9899390	9899835	9900279	9900723
978	9903389	9903833	9904277	9904721	9905164
979	9907827	9908270	9908714	9909158	9909601
980	9912261	9912704	9913147	9913590	9914033
981	9916690	9917133	9917575	9918018	9918461
982	9921115	9921557	9921999	9922441	9922884
983	9925535	9925977	9926419	9926860	9927303
984	9929951	9930392	9930834	9931275	9931716
985	9934362	9934803	9935244	9935685	9936126
986	9938769	9939210	9939650	9940090	9940531
987	9943172	9943612	9944051	9944491	9944931
988	9947569	9948009	9948448	9948888	9949327
989	9951963	9952402	9952841	9953280	9953719
990	9956352	9956791	9957229	9957668	9958106
991	9960737	9961175	9961613	9962051	9962489
992	9965117	9965554	9965992	9966430	9966868
993	9969492	9969930	9970367	9970804	9971242
994	9973864	9974301	9974738	9975174	9975611
995	9978231	9978667	9979104	9979540	9979976
996	9982593	9983029	9983465	9983901	9984337
997	9986952	9987387	9987822	9988258	9988694
998	9991305	9991740	9992176	9992611	9993046
999	9995655	9996090	9996524	9996959	9997393

5	6	7	8	9	Diff.
9887818	9888264	9888710	9889155	9889603	446
9892273	9892718	9893163	9893608	9894053	445
9896722	9897167	9897612	9898056	9898501	445
9901168	9901612	9902056	9902500	9902944	444
9905608	9906052	9906496	9906940	9907382	444
9910044	9910488	9910931	9911374	9911818	443
9914476	9914919	9915362	9915805	9916247	443
9918902	9919345	9919788	9920230	9920673	442
9923326	9923768	9924210	9924651	9925093	442
9927744	9928185	9928627	9929068	9929510	442
9932157	9932598	9933039	9933480	9933921	441
9936566	9937007	9937448	9937888	9938329	441
9940971	9941411	9941851	9942291	9942731	440
9945371	9945811	9946251	9946690	9947130	440
9949767	9950206	9950645	9951085	9951524	439
9954158	9954597	9955036	9955474	9955913	440
9958545	9958983	9959422	9959860	9960298	439
9962927	9963365	9963803	9964241	9964679	438
9967305	9967743	9968180	9968618	9969055	438
9971679	9972116	9972553	9972990	9973427	437
9976048	9976485	9976921	9977358	9977794	437
9980413	9980849	9981285	9981721	9982157	437
9984773	9985209	9985645	9986080	9986516	436
9989129	9989564	9990000	9990435	9990870	435
9993481	9993916	9994350	9994785	9995220	435
9997828	9998262	9998697	9999131	9999566	435

Sinus

G. o

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	Diff. com.	L. Cot.	
0	0		10.0000000		0		Infin.	60
1	6.4637261	3010300	9.9999999	0	6.4637261	3010301	13.5362739	59
2	6.7647561	1760912	9.9999999	1	6.7647562	1760912	13.2352438	58
3	6.9408473	1249387	9.9999998	1	6.9408475	1249388	13.0591525	57
4	7.0657850	969100	9.9999997	2	7.0657863	969101	12.9342137	56
5	7.1626960	791811	9.9999995	2	7.1626964	791814	12.8373036	55
6	7.2418771	669468	9.9999993	2	7.2418778	669470	12.7581222	54
7	7.3088139	579918	9.9999991	3	7.3088148	579921	12.6911752	53
8	7.3668157	511524	9.9999988	3	7.3668169	511527	12.6327183	52
9	7.4179681	457374	9.9999985	3	7.4179696	457377	12.5820304	51
10	7.4637255	413926	9.9999982	4	7.4637273	413930	12.5362727	50
11	7.5051181	377884	9.9999978	4	7.5051203	377888	12.4948797	49
12	7.5429065	347619	9.9999974	5	7.5429091	347624	12.4570909	48
13	7.5776684	321846	9.9999969	5	7.5776715	321851	12.4223285	47
14	7.6098530	299620	9.9999964	5	7.6098566	299635	12.3901434	46
15	7.6398160	280285	9.9999959	6	7.6398201	280291	12.3601799	45
16	7.6678445	262188	9.9999953	6	7.6678492	262194	12.3321508	44
17	7.6941733	248233	9.9999947	7	7.6941786	248240	12.3058214	43
18	7.7189966	234809	9.9999940	7	7.7190026	234815	12.2809974	42
19	7.7424775	222762	9.9999934	7	7.7424841	222769	12.2575159	41
20	7.7647537	211890	9.9999927	8	7.7647610	211898	12.2352390	40
21	7.7859427	202031	9.9999919	8	7.7859508	202039	12.2140492	39
22	7.8061458	193049	9.9999911	8	7.8061547	193057	12.1938453	38
23	7.8254507	184821	9.9999903	9	7.8254604	184830	12.1745396	37
24	7.8439238	177285	9.9999894	9	7.8439444	177294	12.1560556	36
25	7.8616623	170330	9.9999885	9	7.8616738	170339	12.1383262	35
26	7.8786953	163901	9.9999876	10	7.8787077	163911	12.1212923	34
27	7.8950854	157939	9.9999866	10	7.8950988	157950	12.1049012	33
28	7.9108793	152397	9.9999856	11	7.9108938	152406	12.0891062	32
29	7.9261190	147229	9.9999845	11	7.9261343	147240	12.0738656	31
30	7.9408419		9.9999835	10	7.9408584		12.0591416	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. o		Tangentes		
M	L. Sin.	Diff.	L. Cof.	D.	L. Tan.	Dif. co.	L. Cotan.
30	7.9408419		9.9999835		7.9408584		12.0591416
		142400		12		142412	
31	7.9550819		9.9990823		7.9550996		12.0449004
32	7.9688698	127879	9.9999812	11	7.9688886	127890	12.0311114
33	7.9822334	133636	9.9999800	12	7.9822534	133648	12.0177466
34	7.9951980	129646	9.9999788	13	7.9952192	129658	12.0047808
35	8.0077847	125887	9.9999775	13	8.0078092	125900	11.9921908
36	8.0200207	122340	9.9999762	13	8.0200445	122353	11.9799555
37	8.0319195	118988	9.9999748	14	8.0319446	119001	11.9680554
38	8.0435009	115814	9.9999735	13	8.0435274	115828	11.9564726
39	8.0547814	112805	9.9999721	14	8.0548094	112820	11.9451906
40	8.0657763	109949	9.9999706	15	8.0658057	109963	11.9341943
		107234		15		107249	
41	8.0764997	104649	9.9999691	15	8.0765306	104664	11.9234694
42	8.0869646	102186	9.9999676	16	8.0869970	102202	11.9130030
43	8.0971832	99827	9.9999660	16	8.0972172	100853	11.9027828
44	8.1071669	97592	9.9999644	16	8.1072025	97609	11.8927975
45	8.1169262	95448	9.9999628	17	8.1169634	95465	11.8830366
46	8.1264710	93394	9.9999611	17	8.1265099	93411	11.8734901
47	8.1358104	91428	9.9999594	17	8.1358510	91446	11.8641490
48	8.1449532	89542	9.9999577	18	8.1449956	89560	11.8550044
49	8.1539075	87733	9.9999559	18	8.1539516	87751	11.8460484
50	8.1626808		9.9999541		8.1627267		11.8372733
		85996		19		86015	
51	8.1712804	84225	9.9999522	19	8.1713282	84344	11.8286718
52	8.1797129	82719	9.9999503	19	8.1797626	82738	11.8202374
53	8.1879848	81172	9.9999484	20	8.1880364	81192	11.8119636
54	8.1961020	79683	9.9999464	20	8.1961556	79702	11.8038444
55	8.2040703	78246	9.9999444	20	8.2041259	78267	11.7958741
56	8.2118949	76862	9.9999424	21	8.2119526	76882	12.7880474
57	8.2195811	75524	9.9999403	21	8.2196408	75545	11.7802592
58	8.2271335	74222	9.9999382	22	8.2271952	74255	11.7728047
59	8.2345568	72985	9.9999360	22	8.2346208	73007	11.7653792
60	8.2418553		9.9999338		8.2419215		11.7580785
	L. Cof.		L. Sin.		L. Cotan.		L. Tan.

G. 89

Sinus			G. 1		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	8.2418553		9.9999338		8.2419215		11.7580785	60
		71779		22		71800		
1	8.2490332	70611	9.9999316	22	8.2491015	70634	11.7508985	59
2	8.2560943	69481	9.9999294	23	8.2561649	69504	11.7438351	58
3	8.2630424	68386	9.9999271	24	8.2631153	68410	11.7368847	57
4	8.2698810	67326	9.9999247	25	8.2699563	67349	11.7300427	56
5	8.2766136	66298	9.9999224	26	8.2766912	66322	11.7233089	55
6	8.2832434	65300	9.9999200	27	8.2833234	65325	11.7166766	54
7	8.2897734	64333	9.9999175	28	8.2898559	64358	11.7101441	53
8	8.2962057	63393	9.9999150	29	8.2962917	63418	11.7037083	52
9	8.3025460	62481	9.9999125	30	8.3026335	62507	11.6973665	51
10	8.3087941	61595	9.9999100	31	8.3088842	61620	11.6911158	50
				32				
11	8.3149536	60733	9.9999074	33	8.3150462	60752	11.6849528	49
12	8.3210269	59894	9.9999047	34	8.3211221	59921	11.6788779	48
13	8.3270163	59080	9.9999021	35	8.3271143	59106	11.6728857	47
14	8.3329243	58286	9.9998994	36	8.3330249	58314	11.6669751	46
15	8.3387519	57414	9.9998966	37	8.3388563	57542	11.6611437	45
16	8.3445043	56762	9.9998939	38	8.3446105	56790	11.6553895	44
17	8.3501805	56020	9.9998911	39	8.3502895	56058	11.6497105	43
18	8.3557835	55315	9.9998882	40	8.3558953	55344	11.6441047	42
19	8.3613150	54619	9.9998853	41	8.3614297	54648	11.6385703	41
20	8.3667769	53941	9.9998824	42	8.3668945	53970	11.6331055	40
				43				
21	8.3721710	53278	9.9998794	44	8.3722915	53308	11.6277085	39
22	8.3774988	52632	9.9998764	45	8.3776223	52662	11.6223777	38
23	8.3827620	52012	9.9998734	46	8.3828886	52032	11.6171114	37
24	8.3879622	51386	9.9998703	47	8.3880918	51418	11.6119082	36
25	8.3931008	50785	9.9998672	48	8.3932336	50816	11.6067664	35
26	8.3981793	50197	9.9998641	49	8.3983152	50220	11.6016848	34
27	8.4031990	49624	9.9998609	50	8.4033381	49656	11.5966619	33
28	8.4081614	49062	9.9998577	51	8.4083037	49095	11.5916963	32
29	8.4130676	48514	9.9998544	52	8.4132232	48547	11.5867868	31
30	8.4179190		9.9998512	53	8.4180679		11.5819321	30
				54				
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 83

Sinus			G. 1		Tangentes		
M	L. Sin.	Diff.	L. Cosf.	D.	L. Tan.	D. co.	L. Cot.
30	8.4179190		9.9998511		8.4180679		11.5819321
		47978		34		48011	
31	8.4227168		9.9998478		8.4228690		11.5771310
32	8.4274621	47453	9.9998445	33	8.4276176	47486	11.5723824
33	8.4321561	46940	9.9998411	34	8.4323150	46974	11.5676850
34	8.4367999	46438	9.9998376	35	8.4369612	46472	11.5630378
35	8.4413949	45950	9.9998342	36	8.4415603	45981	11.5584397
36	8.4459409	45460	9.9998306	37	8.4461103	45500	11.5538897
37	8.4504402	45093	9.9998271	38	8.4506131	45028	11.5493869
38	8.4548934	44532	9.9998235	39	8.4550699	44568	11.5449301
39	8.4593013	44079	9.9998199	40	8.4594814	44115	11.5405186
40	8.4636649	43636	9.9998162	37	8.4638486	43672	11.5361514
		43021		37		43239	
41	8.4679850	42776	9.9998125	37	8.4681725	42813	11.5318275
42	8.4722626	42358	9.9998088	38	8.4724538	42395	11.5275462
43	8.4764582	41948	9.9998050	38	8.4766933	41987	11.5233067
44	8.4806932	41547	9.9998012	38	8.4808920	41585	11.5191080
45	8.4848479	41153	9.9997974	39	8.4850505	41191	11.5149495
46	8.4889632	40766	9.9997935	39	8.4891696	40806	11.5108304
47	8.4930398	40386	9.9997896	40	8.4932502	40426	11.5067498
48	8.4970782	40014	9.9997856	39	8.4972928	40054	11.5027072
49	8.5010798	39649	9.9997817	41	8.5012982	39689	11.4987018
50	8.5050447	39289	9.9997776	41	8.5052672	38330	11.4947329
		39289		40		38330	
51	8.5089736	38937	9.9997736	41	8.5092001	38977	11.4907999
52	8.5128673	38591	9.9997695	42	8.5130978	38635	11.4869022
53	8.5167264	38250	9.9997653	41	8.5169610	38299	11.4830387
54	8.5205514	37916	9.9997612	42	8.5207902	37958	11.4792058
55	8.5243430	37587	9.9997570	43	8.5245860	37630	11.4754140
56	8.5281017	37264	9.9997527	43	8.5283490	37307	11.4716510
57	8.5318281	36947	9.9997484	43	8.5320797	36990	11.4679203
58	8.5355228	36635	9.9997441	43	8.5357787	36679	11.4642213
59	8.5391863	36329	9.9997398	44	8.5394466	36372	11.4605524
60	8.5428192		9.9997354		8.5430838		11.4569162
	L. Cosf.		L. Sin.		L. Cot.		L. Tan.

G. 86

G. 86

Q

Sinus			G. 2		Tangentes			
N.	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	8.54:8192		9.9997354		8.5430838		11.4569162	60
		36026		45		36071		
1	8.5464218		9.9997309		8.5466909		11.4522091	59
2	8.5499948	35730	9.9997265	44	8.5502682	35774	11.4497217	58
3	8.5535386	35438	9.9997220	45	8.5538166	35482	11.4461834	57
4	8.5570536	35150	9.9997174	46	8.5573362	35196	11.4426638	56
5	8.5605404	34868	9.9997128	46	8.5608276	34914	11.4391724	55
6	8.5639994	34590	9.9997082	46	8.5642912	34636	11.4357088	54
7	8.5674110	34316	9.9997036	46	8.5677275	34362	11.4322725	53
8	8.5708257	34047	9.9996989	47	8.5711368	34093	11.4288632	52
9	8.5742132	33782	9.9996942	47	8.5745197	33829	11.4254802	51
10	8.5775660	33521	9.9996894	48	8.5778766	33569	11.4221234	50
		33263		48		33311		
11	8.5808923		9.9996846	48	8.5812077		11.4187923	49
12	8.5841933	33010	9.9996798	49	8.5845136	33059	11.4154864	48
13	8.5874694	32761	9.9996749	49	8.5877945	32809	11.4122055	47
14	8.5907209	32515	9.9996700	50	8.5910509	32564	11.4089491	46
15	8.5939483	32274	9.9996650	49	8.5942832	32323	11.4057168	45
16	8.5971517	32034	9.9996601	51	8.5974917	32085	11.4025083	44
17	8.6003217	31800	9.9996550	50	8.6006767	31850	11.3993233	43
18	8.6034886	31569	9.9996500	51	8.6038386	31619	11.3961614	42
19	8.6066226	31340	9.9996449	51	8.6069777	31391	11.3930223	41
20	8.6097341	31115	9.9996398	52	8.6101943	31166	11.3899057	40
		30894		52		30946		
21	8.6128235	30675	9.9996346	52	8.6121889		11.3868111	39
22	8.6158910	30459	9.9996294	52	8.6152616	30727	11.3837384	38
23	8.6189369	30247	9.9996242	53	8.6183127	30511	11.3806873	37
24	8.6219616	30037	9.9996189	53	8.6213427	30300	11.3776573	36
25	8.6249652	29831	9.9996136	53	8.6243518	30091	11.3746482	35
26	8.6279484	29627	9.9996082	54	8.6273402	29884	11.3716598	34
27	8.6309111	29426	9.9996028	54	8.6303083	29681	11.3686917	33
28	8.6338537	29227	9.9995974	54	8.6332563	29480	11.3657437	32
29	8.6367764	29032	9.9995919	55	8.6361845	29282	11.3628155	31
30	8.6396796		9.9995865	54	8.6400931	29096	11.3599059	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 87

Sines

G. 2

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	8.6396796		9.9995865		8.6400931		11.3599069	30
		28838		56		28894		
31	8.6425624		9.9995809		8.6429825		11.3570175	29
32	8.6454282	28648	9.9995753	56	8.6458528	28703	11.3541472	28
33	8.6482742	28460	9.9995697	56	8.6487044	28516	11.3512956	27
34	8.6511016	28264	9.9995641	56	8.6515375	28331	11.3484625	26
35	8.6539107	28091	9.9995584	57	8.6543522	28147	11.3456478	25
36	8.6567017	27910	9.9995527	57	8.6571490	27968	11.3428510	24
37	8.6594748	27731	9.9995469	58	8.6599279	27789	11.3400721	23
38	8.6622303	27655	9.9995411	58	8.6626891	27612	11.3372109	22
39	8.6649684	27381	9.9995353	58	8.6654321	27440	11.3344669	21
40	8.6676893	27209	9.9995295	58	8.6681598	27267	11.3318402	20
		27039		59		27199		
41	8.6703922		9.9995236	60	8.6708697		11.3291302	19
42	8.6730804	26872	9.9995176	60	8.6735628	26921	11.3264372	18
43	8.6757510	26706	9.9995116	60	8.6762392	26765	11.3237607	17
44	8.6784052	26512	9.9995056	60	8.6788996	26603	11.3211004	16
45	8.6810422	26381	9.9994996	61	8.6815437	26441	11.3184563	15
46	8.6836654	26221	9.9994935	61	8.6841719	26282	11.3158281	14
47	8.6862718	26064	9.9994874	62	8.6867844	26125	11.3132156	13
48	8.6888625	25907	9.9994812	62	8.6893813	25969	11.3106187	12
49	8.6914379	25754	9.9994750	62	8.6919629	25816	11.3080377	11
50	8.6939980	25601	9.9994688	62	8.6945292	25663	11.3054708	10
		25451		63		25514		
51	8.6965421		9.9994625	63	8.6970806		11.3029194	9
52	8.6990724	25303	9.9994562	63	8.6996173	25366	11.3003828	8
53	8.7015889	25255	9.9994498	64	8.7021290	25218	11.2978610	7
54	8.7040899	25010	9.9994435	63	8.7046265	25075	11.2953525	6
55	8.7065766	24867	9.9994370	65	8.7071395	24930	11.2928605	5
56	8.7090490	24724	9.9994306	64	8.7096185	24790	11.2903815	4
57	8.7115075	24585	9.9994241	65	8.7120734	24649	11.2879166	3
58	8.7139520	24445	9.9994176	65	8.7145345	24511	11.2854655	2
59	8.7163829	24309	9.9994110	66	8.7169719	24374	11.2830281	1
60	8.7188002	24173	9.9994044	66	8.7193958	24239	11.2806042	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 87

Q 2

Sinus			G. 3		Tangentes		
M	L Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
0	8.7188002		9.9994044		8.7193958		11.2806042
		24038		66		24105	
1	8.7212040	23906	9.9993978	67	8.7218063	23972	11.2718063
2	8.7235946	23885	9.9993911	67	8.7242035	23942	11.2757965
3	8.7259721	23865	9.9993843	68	8.7265877	23912	11.2734123
4	8.7283266	23845	9.9993776	68	8.7289589	23885	11.2700111
5	8.7306882	23816	9.9993708	68	8.7313174	23857	11.2684826
6	8.7330272	23790	9.9993640	68	8.7336631	23827	11.2663269
7	8.7353535	23762	9.9993572	68	8.7359963	23797	11.2640026
8	8.7376675	23740	9.9993503	69	8.7383172	23768	11.2616828
9	8.7399691	23716	9.9993433	70	8.7406258	23738	11.2593742
10	8.7422586	23695	9.9993364	69	8.7429222	23708	11.2570778
		23774		71		23845	
11	8.7445260	23655	9.9993293	70	8.7452067	23715	11.2547933
12	8.7468015	23638	9.9993223	71	8.7474792	23688	11.2525208
13	8.7490553	23620	9.9993152	71	8.7497400	23660	11.2502600
14	8.7512973	23605	9.9993081	72	8.7519892	23632	11.2480108
15	8.7535278	23591	9.9993009	72	8.7542269	23604	11.2457731
16	8.7557459	23577	9.9992938	72	8.7564531	23577	11.2435469
17	8.7579546	23566	9.9992865	72	8.7586681	23550	11.2413319
18	8.7601512	23554	9.9992792	72	8.7608719	23522	11.2391281
19	8.7623366	23545	9.9992720	73	8.7630647	23495	11.2369353
20	8.7645111	23536	9.9992646	74	8.7652465	23468	11.2347535
		23636		74		23710	
21	8.7666747	23528	9.9992572	74	8.7674175	23441	11.2325825
22	8.7688275	23522	9.9992498	74	8.7695777	23414	11.2304222
23	8.7709697	23511	9.9992424	74	8.7717274	23387	11.2282716
24	8.7731014	23502	9.9992349	75	8.7738665	23361	11.2261225
25	8.7752226	23496	9.9992274	75	8.7759952	23335	11.2240048
26	8.7773334	23490	9.9992198	76	8.7781136	23309	11.2218864
27	8.7794340	23484	9.9992122	76	8.7802218	23284	11.2197782
28	8.7815244	23480	9.9992046	77	8.7823199	23259	11.2176801
29	8.7836048	23475	9.9991969	77	8.7844079	23234	11.2155921
30	8.7856753	23470	9.9991892	77	8.7864861	23209	11.2135139
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

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SINUS

G. 3

TANGENTES

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	8.7856753		9.9991892		8.7864861		11.2135139	30
		10606		77		10683		
31	8.7877359		9.9991815		8.7885544		11.2114456	29
32	8.7897867	20508	9.9991737	78	8.7906130	20586	11.2093870	28
33	8.7918278	20411	9.9991659	78	8.7926620	20490	11.2073380	27
34	8.7938594	20316	9.9991580	79	8.7947014	20394	11.2052986	26
35	8.7958814	20220	9.9991501	79	8.7967313	20299	11.2032687	25
36	8.7978941	20127	9.9991422	79	8.7987519	20206	11.2012481	24
37	8.7998974	20033	9.9991342	80	8.8007632	20113	11.1992368	23
38	8.8018915	19941	9.9991262	80	8.8027653	20021	11.1972347	22
39	8.8038764	19849	9.9991182	80	8.8047583	19920	11.1952417	21
40	8.8058523	19759	9.9991101	81	8.8067422	19839	11.1932578	20
		19669		81		19750		
41	8.8078192	19580	9.9991020	82	8.8087172	19662	11.1912828	19
42	8.8097772	19492	9.9990938	82	8.8106834	19573	11.1893166	18
43	8.8117262	19404	9.9990856	82	8.8126407	19487	11.1873593	17
44	8.8136668	19317	9.9990774	82	8.8145894	19400	11.1854106	16
45	8.8155985	19232	9.9990691	83	8.8165294	19314	11.1834706	15
46	8.8175217	19146	9.9990608	83	8.8184608	19230	11.1815392	14
47	8.8194363	19062	9.9990525	83	8.8203828	19146	11.1796162	13
48	8.8213425	18979	9.9990441	83	8.8222984	19062	11.1777016	12
49	8.8232404	18895	9.9990357	84	8.8242046	18980	11.1757954	11
50	8.8251299	18813	9.9990273	84	8.8261026	18898	11.1738974	10
				85				
51	8.8270112	18732	9.9990188	85	8.8279924	18817	11.1720076	9
52	8.8288844	18651	9.9990103	86	8.8298741	18737	11.1701259	8
53	8.8307495	18571	9.9990017	86	8.8317478	18656	11.1682522	7
54	8.8326066	18491	9.9989931	86	8.8336134	18578	11.1663866	6
55	8.8344557	18412	9.9989845	87	8.8354712	18499	11.1645288	5
56	8.8362969	18335	9.9989758	87	8.8373211	18422	11.1626789	4
57	8.8381304	18257	9.9989672	87	8.8391633	18344	11.1608367	3
58	8.8399561	18180	9.9989584	88	8.8409977	18278	11.1590023	2
59	8.8417741	18104	9.9989496	88	8.8428245	18192	11.1571755	1
60	8.8435845		9.9989408		8.8446437		11.1553563	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	

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SINUS.

G. 4

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	Diff.	L. Cot.	
0	8.8435845		9.9989408		8.8446437		11.1553563	60
		18029		89		18117		
1	8.8452874	17952	9.9989319	89	8.8454554	18042	11.1535446	59
2	8.8471827	17880	9.9989230	89	8.8482597	17969	11.1517402	58
3	8.8489707	17805	9.9989141	89	8.8500566	17895	11.1499424	57
4	8.8507512	17732	9.9989052	90	8.8518461	17822	11.1481539	56
5	8.8525245	17660	9.9988962	91	8.8536283	17751	11.1463717	55
6	8.8542905	17588	9.9988871	91	8.8554034	17679	11.1445966	54
7	8.8560492	17517	9.9988780	91	8.8571713	17608	11.1428218	53
8	8.8578010	17447	9.9988689	91	8.8589221	17538	11.1410679	52
9	8.8595457	17376	9.9988598	92	8.8606859	17468	11.1393141	51
10	8.8612833		9.9988506	92	8.8624327		11.1375672	50
		17306		92		17398		
11	8.8620129	17237	9.9988414	93	8.8641725	17330	11.1358275	49
12	8.8647376	17169	9.9988321	93	8.8659055	17262	11.1340945	48
13	8.8664545	17101	9.9988228	93	8.8676317	17194	11.1323682	47
14	8.8681646	17034	9.9988135	94	8.8693511	17127	11.1306489	46
15	8.8698580	16966	9.9988041	94	8.8710638	17061	11.1289262	45
16	8.8715646	16900	9.9987947	94	8.8727699	16995	11.1272201	44
17	8.8732546	16835	9.9987852	95	8.8744694	16929	11.1255206	43
18	8.8749281	16769	9.9987758	95	8.8761622	16864	11.1238277	42
19	8.8766150	16704	9.9987663	96	8.8778587	16799	11.1221513	41
20	8.8782834		9.9987567	96	8.8795281		11.1204714	40
		16639		96		16736		
21	8.8799492	16576	9.9987471	96	8.8812022	16672	11.1187978	39
22	8.8816069	16512	9.9987375	97	8.8828694	16609	11.1171206	38
23	8.8832581	16450	9.9987278	97	8.8845302	16547	11.1154697	37
24	8.8849031	16387	9.9987181	97	8.8861850	16483	11.1138150	36
25	8.8865418	16325	9.9987084	98	8.8878324	16422	11.1121666	35
26	8.8881742	16264	9.9986986	98	8.8894757	16361	11.1105222	34
27	8.8898007	16202	9.9986888	98	8.8911119	16301	11.1088881	33
28	8.8914209	16142	9.9986790	99	8.8927420	16240	11.1072580	32
29	8.8930351	16082	9.9986691	99	8.8943660	16182	11.1056240	31
30	8.8946433		9.9986591	100	8.8959842		11.1040158	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	

SINUS

G. 4

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	8.8946433		9.9986591		8.8959842		11.1040158	30
		16022		99		16121		
31	8.8962450		9.9986492		8.8975963		11.1024037	29
32	8.8978418	15963	9.9986392	100	8.8992026	16063	11.1007974	28
33	8.8994322	15904	9.9986292	100	8.9008030	16004	11.0991970	27
34	8.9010168	15846	9.9986191	101	8.9023977	15945	11.0976023	26
35	8.9025955	15787	9.9986090	101	8.9039866	15889	11.0960134	25
36	8.9041685	15730	9.9985988	102	8.9055697	15831	11.0944302	24
37	8.9057358	15673	9.9985886	102	8.9071472	15775	11.0928528	23
38	8.9072975	15617	9.9985784	102	8.9087190	15718	11.0912810	22
39	8.9088535	15560	9.9985682	102	8.9102853	15663	11.0897147	21
40	8.9104039	15504	9.9985579	103	8.9118460	15607	11.0881540	20
		15448		104		15552		
41	8.9119487		9.9985475		8.9134012		11.0865988	19
42	8.9134881	15394	9.9985372	103	8.9149509	15497	11.0850491	18
43	8.9150219	15338	9.9985268	104	8.9164952	15442	11.0835048	17
44	8.9165504	15285	9.9985162	105	8.9180340	15388	11.0819660	16
45	8.9180734	15230	9.9985058	105	8.9195675	15335	11.0804325	15
46	8.9195911	15177	9.9984953	105	8.9210957	15282	11.0788904	14
47	8.9211103	15123	9.9984848	105	8.9226186	15229	11.0773814	13
48	8.9226105	15071	9.9984742	106	8.9241363	15177	11.0758637	12
49	8.9241123	15018	9.9984636	106	8.9256487	15124	11.0743513	11
50	8.9256089	14966	9.9984529	107	8.9271560	15073	11.0728440	10
		14914		107		15021		
51	8.9271003	14862	9.9984422	107	8.9286581	14971	11.0713419	9
52	8.9285866	14812	9.9984315	108	8.9301552	14919	11.0698448	8
53	8.9300678	14761	9.9984207	108	8.9316471	14869	11.0683529	7
54	8.9315439	14711	9.9984099	109	8.9331340	14820	11.0668660	6
55	8.9330150	14661	9.9983990	109	8.9346160	14769	11.0653840	5
56	8.9344811	14611	9.9983881	109	8.9360929	14721	11.0639071	4
57	8.9359422	14561	9.9983772	109	8.9375650	14671	11.0624350	3
58	8.9373983	14513	9.9983663	110	8.9390321	14625	11.0609679	2
59	8.9388496	14464	9.9983553	111	8.9404944	14574	11.0595056	1
60	8.9402960		9.9983442		8.9419518		11.0580482	0
	L. Cos.		L. Sin.		L. Cot.		Tan.	M

G. 85

Sine			Cos.			Tangentes		
M	L. Sin.	Diff.	L. Cos.	D	L. Tan.	D. co	L. Cot.	
0	8.9402960		9.9983442		8.9419518		11.0580482	60
		14416		110		14526		
1	8.9417376		9.9983332		8.9434044		11.0565956	59
2	8.9431743	14367	9.9983220	112	8.9448523	14479	11.0551477	58
3	8.9446063	14320	9.9983109	112	8.9462954	14431	11.0537046	57
4	8.9460335	14272	9.9982997	112	8.9477328	14384	11.0522662	56
5	8.9474561	14226	9.9982885	112	8.9491676	14338	11.0508324	55
6	8.9488729	14178	9.9982772	113	8.9505967	14291	11.0494033	54
7	8.9502871	14132	9.9982660	112	8.9520211	14244	11.0479789	53
8	8.9516957	14086	9.9982546	114	8.9534410	14199	11.0465590	52
9	8.9530996	14039	9.9982432	113	8.9548564	14154	11.0451436	51
10	8.9544991	13995	9.9982318	115	8.9562672	14108	11.0437328	50
		13949		114		14063		
11	8.9558940		9.9982204		8.9576785		11.0423265	49
12	8.9572843	13903	9.9982089	115	8.9590754	14019	11.0409246	48
13	8.9586703	13860	9.9981974	115	8.9604728	13974	11.0395272	47
14	8.9600517	13814	9.9981859	115	8.9618659	13931	11.0381341	46
15	8.9614288	13771	9.9981743	116	8.9632545	13886	11.0367455	45
16	8.9628014	13726	9.9981626	117	8.9646388	13842	11.0353612	44
17	8.9641697	13683	9.9981510	118	8.9660188	13800	11.0339812	43
18	8.9655327	13640	9.9981392	117	8.9673944	13756	11.0326056	42
19	8.9668924	13597	9.9981275	118	8.9687658	13714	11.0312342	41
20	8.9682487	13553	9.9981158	117	8.9701330	13672	11.0298670	40
		13512		118		13629		
21	8.9695999		9.9981040		8.9714959		11.0285041	39
22	8.9709468	13469	9.9980921	119	8.9728547	13588	11.0271452	38
23	8.9722895	13427	9.9980802	119	8.9742102	13545	11.0257908	37
24	8.9736280	13385	9.9980683	119	8.9755597	13505	11.0244403	36
25	8.9749624	13364	9.9980563	120	8.9769060	13463	11.0230940	35
26	8.9762926	13302	9.9980443	120	8.9782483	13423	11.0217517	34
27	8.9776188	13262	9.9980323	120	8.9795865	13382	11.0204135	33
28	8.9789408	13220	9.9980202	121	8.9809206	13341	11.0190794	32
29	8.9802589	13181	9.9980081	121	8.9822507	13301	11.0177493	31
30	8.9815729	13140	9.9979960	121	8.9835769	13262	11.0164231	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

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Sinus		G. 5		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
30	8.9815729		9.9979960		8.9835769		11.0164231
		13100		122		13212	
31	8.9828829		9.9979838		8.9848991		11.0151009
32	8.9841889	13060	9.9979717	122	8.9862173	13182	11.0137827
33	8.9854910	13021	9.9979593	123	8.9875317	13144	11.0124683
34	8.9867891	12981	9.9979470	123	8.9888421	13104	11.0111579
35	8.9880834	12942	9.9979347	123	8.9901487	13066	11.0098513
36	8.9893737	12902	9.9979223	124	8.9914514	13027	11.0085486
37	8.9906602	12865	9.9979099	124	8.9927503	12989	11.0072497
38	8.9919429	12827	9.9978975	124	8.9940454	12951	11.0059546
39	8.9932217	12788	9.9978850	125	8.9953367	12913	11.0046633
40	8.9944968	12751	9.9978725	125	8.9966243	12876	11.0033757
		12713		126		12839	
41	8.9957681		9.9978599		8.9979081		11.0020918
42	8.9970356	12675	9.9978473	126	8.9991883	12801	11.0008117
43	8.9982994	12638	9.9978347	126	9.0004647	12764	10.9995353
44	8.9995595	12601	9.9978220	127	9.0017375	12728	10.9982625
45	9.0008160	12565	9.9978093	127	9.0030066	12691	10.9969924
46	9.0020687	12527	9.9977966	127	9.0042721	12655	10.9957279
47	9.0033179	12492	9.9977838	128	9.0055340	12619	10.9944660
48	9.0045634	12455	9.9977710	128	9.0067924	12584	10.9932076
49	9.0058053	12419	9.9977582	128	9.0080471	12547	10.9919529
50	9.0070436	12383	9.9977453	129	9.0092984	12513	10.9907016
		12348		130		12477	
51	9.0082784	12312	9.9977323	129	9.0105461	12442	10.9894539
52	9.0095096	12278	9.9977194	130	9.0117903	12407	10.9882097
53	9.0107374	12242	9.9977064	131	9.0130310	12372	10.9869690
54	9.0119616	12207	9.9976933	130	9.0142682	12339	10.9857318
55	9.0131822	12173	9.9976803	131	9.0155021	12304	10.9844979
56	9.0143996	12139	9.9976672	132	9.0167325	12269	10.9832675
57	9.0156135	12104	9.9976540	132	9.0179594	12237	10.9820406
58	9.0168239	12070	9.9976408	132	9.0191831	12202	10.9808169
59	9.0180309	12037	9.9976276	133	9.0204032	12179	10.9795967
60	9.0192346		9.9976143		9.0216202		10.9783798
	L. Sin.		L. Cos.		L. Tan.		L. Cot.

G. 84

R

Sinus			G. 6		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.0192346		9.9976143		9.0216202		10.9783798	60
		12002		132		12136		
1	9.0204348		9.9976011		9.0228338		10.9771662	59
2	9.0216318	11970	9.9975877	134	9.0240441	12103	10.9759559	58
3	9.0228254	11946	9.9975743	134	9.0252510	12069	10.9747490	57
4	9.0240157	11903	9.9975609	134	9.0264548	12038	10.9735452	56
5	9.0252027	11870	9.9975475	134	9.0276552	12004	10.9723448	55
6	9.0263865	11838	9.9975340	135	9.0288525	12072	10.9711476	54
7	9.0275669	11804	9.9975205	135	9.0300464	11940	10.9699536	53
8	9.0287442	11773	9.9975069	136	9.0312272	11909	10.9687627	52
9	9.0299182	11740	9.9974933	136	9.0324229	11876	10.9675751	51
10	9.0310890	11708	9.9974797	136	9.0336093	11844	10.9663907	50
		11677		137		11813		
11	9.0322567		9.9974660		9.0347906		10.9652094	49
12	9.0334212	11645	9.9974523	137	9.0359688	11782	10.9640312	48
13	9.0345825	11613	9.9974386	137	9.0371439	11751	10.9628561	47
14	9.0357407	11581	9.9974248	138	9.0383159	11720	10.9616841	46
15	9.0368958	11551	9.9974110	138	9.0394848	11689	10.9605152	45
16	9.0380477	11519	9.9973971	139	9.0406506	11658	10.9593494	44
17	9.0391966	11489	9.9973832	138	9.0418124	11628	10.9581866	43
18	9.0403424	11458	9.9973693	140	9.0429721	11597	10.9570269	42
19	9.0414852	11428	9.9973554	139	9.0441299	11568	10.9558701	41
20	9.0426249	11397	9.9973414	140	9.0452836	11537	10.9547164	40
		11368		141		11507		
21	9.0437617		9.9973273		9.0464343		10.9535657	39
22	9.0448954	11337	9.9973132	141	9.0475821	11478	10.9524179	38
23	9.0460261	11307	9.9972991	141	9.0487270	11449	10.9512730	37
24	9.0471538	11277	9.9972850	141	9.0498689	11419	10.9501311	36
25	9.0482786	11248	9.9972708	42	9.0510078	11389	10.9489922	35
26	9.0494005	11219	9.9972566	142	9.0521439	11361	10.9478561	34
27	9.0505194	11189	9.9972423	142	9.0532771	11332	10.9467229	33
28	9.0516354	11160	9.9972280	142	9.0544074	11303	10.9455926	32
29	9.0527485	11131	9.9972137	143	9.0555349	11275	10.9444651	31
30	9.0538588	11103	9.9971993	144	9.0566595	11246	10.9433405	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus

G. 6

Tangentes

M	L.Sin.	Diff.	L.Cof.	D.	L.Tan.	D. co.	L. Cor.	
30	9.0538588		9.9971993		9.0566595		10.9433405	30
		11073		144		11218		
31	9.0549561		9.9971849		9.0577813		10.9422187	29
32	9.0560705	11045	9.9971 04	145	9.0589002	11189	10.9410998	28
33	9.0571722	11017	9.9971559	145	9.0600164	11162	10.9399836	27
34	9.0582711	10988	9.9971414	145	9.0611297	11133	10.9388702	26
35	9.0593672	10961	9.9971268	146	9.0622400	11105	10.9377597	25
36	9.0604604	10932	9.9971122	146	9.0633482	11079	10.9366518	24
37	9.0615509	10903	9.9970976	146	9.0644522	11051	10.9355467	23
38	9.0626386	10877	9.9970829	147	9.0655556	11023	10.9344444	22
39	9.0637235	10847	9.9970682	147	9.0666552	10997	10.9333447	21
40	9.0648057	10822	9.9970535	147	9.0677522	10969	10.9322475	20
		10793		148		10943		
41	9.0658852	10767	9.9970387	148	9.0688465	10916	10.9311525	19
42	9.0669619	10741	9.9970239	148	9.0699381	10889	10.9300619	18
43	9.0680360	10714	9.9970090	149	9.0710270	10863	10.9289730	17
44	9.0691074	10687	9.9969941	149	9.0721133	10836	10.9278857	16
45	9.0701761	10660	9.9969792	150	9.0731969	10810	10.9268021	15
46	9.0712421	10633	9.9969642	150	9.0742779	10784	10.9257221	14
47	9.0723055	10608	9.9969492	150	9.0753563	10758	10.9246437	13
48	9.0733663	10581	9.9969342	151	9.0764321	10732	10.9235679	12
49	9.0744244	10555	9.9969191	151	9.0775052	10707	10.9224947	11
50	9.0754799	10520	9.9969040	152	9.0785760	10671	10.9214240	10
		10503		152		10655		
51	9.0765229	10478	9.9968888	152	9.0796441	10630	10.9203559	9
52	9.0775832	10452	9.9968736	153	9.0807096	10605	10.9192904	8
53	9.0786310	10427	9.9968584	153	9.0817726	10580	10.9182274	7
54	9.0796752	10401	9.9968431	153	9.0828321	10555	10.9171669	6
55	9.0807189	10376	9.9968278	154	9.0838911	10530	10.9161089	5
56	9.0817590	10351	9.9968125	154	9.0849466	10505	10.9150534	4
57	9.0827966	10326	9.9967971	155	9.0859995	10480	10.9140004	3
58	9.0838317	10302	9.9967817	155	9.0870501	10457	10.9129499	2
59	9.0848643		9.9967662	155	9.0880981		10.9119019	1
60	9.0858945		9.9967507		9.0891438		10.9108562	0
	L. Cof.		L. Sin.		L. Cor.		L. Tan.	M

G. 83

R 2

SINUS			G. 7			Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	Diff.	L. Cot.	
0	9.0858945		9.9967507		9.0891478		10.9108562	60
1		10276		155		10431		
2	9.0869221	10252	9.9967352	156	9.0901869	10408	10.9098131	59
3	9.0879473	10227	9.9967196	156	9.0912277	10383	10.9087723	58
4	9.0889700	10203	9.9967040	156	9.0922660	10360	10.9077340	57
5	9.0899902	10179	9.9966884	157	9.0933020	10335	10.9066980	56
6	9.0910082	10155	9.9966727	157	9.0943355	10312	10.9056645	55
7	9.0920237	10130	9.9966570	158	9.0953669	10288	10.9046333	54
8	9.0930367	10117	9.9966412	158	9.0963955	10264	10.9036045	53
9	9.0940474	10082	9.9966254	158	9.0974219	10241	10.9025781	52
10	9.0950556	10059	9.9966096	159	9.0984460	10218	10.9015540	51
	9.0960615		9.9955937		9.0994678		10.9005322	50
		10036		159		10194		
11	9.0970651	10011	9.9955778	159	9.1004872	10172	10.8995128	49
12	9.0980662	9989	9.9955619	160	9.1015044	10148	10.8984956	48
13	9.0990651	9965	9.9955459	160	9.1025192	10125	10.8974808	47
14	9.1000616	9942	9.9955299	161	9.1035312	10102	10.8964683	46
15	9.1010558	9919	9.9955138	161	9.1045420	10080	10.8954580	45
16	9.1020477	9896	9.9954977	161	9.1055500	10057	10.8944500	44
17	9.1030372	9873	9.9954816	161	9.1065557	10034	10.8934442	43
18	9.1040246	9850	9.9954655	162	9.1075591	10013	10.8924309	42
19	9.1050096	9828	9.9954492	162	9.1085604	9990	10.8914396	41
20	9.1059924		9.9954330		9.1095594		10.8904405	40
		9805		163		9968		
21	9.1069729	9782	9.9954167	163	9.1105562	9946	10.8894428	39
22	9.1079512	9760	9.9954004	163	9.1115508	9923	10.8884492	38
23	9.1089272	9738	9.9953841	163	9.1125431	9902	10.8874569	37
24	9.1099010	9716	9.9953677	164	9.1135333	9880	10.8864667	36
25	9.1108726	9694	9.9953513	165	9.1145213	9859	10.8854787	35
26	9.1118420	9672	9.9953348	165	9.1155072	9837	10.8844928	34
27	9.1128092	9650	9.9953182	165	9.1164909	9815	10.8835091	33
28	9.1137742	9628	9.9953018	166	9.1174724	9794	10.8825276	32
29	9.1147370	9607	9.9952852	166	9.1184518	9773	10.8815482	31
30	9.1156977		9.9952686		9.1194291		10.8805709	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus		G. 7		Tangentes	
M	L. Sin.	L. Cos.	L. Tan.	L. Cot.	
30	9.1156977	9.9962686	9.1194291	10.8805709	30
	9585	167	9752		
31	9.1166562	9.9962519	9.1204043	10.8795957	29
32	9.1176125	9.9962352	9.1213773	10.8786227	28
33	9.1185667	9.9962185	9.1223482	10.8776518	27
34	9.1195188	9.9962017	9.1233171	10.8766829	26
35	9.1204688	9.9961849	9.1242839	10.8757161	25
36	9.1214167	9.9961681	9.1252486	10.8747514	24
37	9.1223624	9.9961512	9.1262112	10.8737888	23
38	9.1233061	9.9961343	9.1271718	10.8728282	22
39	9.1242477	9.9961174	9.1281303	10.8718697	21
40	9.1251872	9.9961004	9.1290868	10.8709132	20
	9374	170	9545		
41	9.1261246	9.9960834	9.1300413	10.8699587	19
42	9.1270600	9.9960663	9.1309937	10.8690062	18
43	9.1279934	9.9960492	9.1319442	10.8680558	17
44	9.1289247	9.9960321	9.1328926	10.8671074	16
45	9.1298539	9.9960149	9.1338391	10.8661609	15
46	9.1307812	9.9959977	9.1347835	10.8652165	14
47	9.1317064	9.9959804	9.1357260	10.8642730	13
48	9.1326297	9.9959631	9.1366665	10.8633305	12
49	9.1335509	9.9959458	9.1376051	10.8623899	11
50	9.1344702	9.9959284	9.1385417	10.8614583	10
	9173	173	9347		
51	9.1353875	9.9959111	9.1394764	10.8605266	9
52	9.1363028	9.9958936	9.1404092	10.8595958	8
53	9.1372161	9.9958761	9.1413400	10.8586650	7
54	9.1381275	9.9958586	9.1422689	10.8577341	6
55	9.1390370	9.9958411	9.1431959	10.8568041	5
56	9.1399445	9.9958235	9.1441210	10.8558749	4
57	9.1408501	9.9958059	9.1450442	10.8549455	3
58	9.1417537	9.9957882	9.1459655	10.8540155	2
59	9.1426555	9.9957705	9.1468850	10.8530850	1
60	9.1435553	9.9957528	9.1478025	10.8521545	0
	L. Cot.	L. Sin.	L. Cot.	L. Tan.	M

SINUS

G. 8

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. Co.	L. Cot.	
0	9.1435553	8979	9.9957528	178	9.1478025	9167	10.8521975	60
1	9.1444532	8961	9.9957250	178	9.1487182	9139	10.8512818	59
2	9.1453493	8942	9.9957172	179	9.1496321	9120	10.8503679	58
3	9.1462435	8923	9.9956993	178	9.1505441	9102	10.8494559	57
4	9.1471359	8904	9.9956815	180	9.1514543	9084	10.8485437	56
5	9.1480261	8886	9.9956635	179	9.1523627	9065	10.8476373	55
6	9.1489148	8867	9.9956456	180	9.1532692	9047	10.8467308	54
7	9.1498015	8849	9.9956276	181	9.1541739	9030	10.8458261	53
8	9.1506864	8830	9.9956095	180	9.1550769	9011	10.8449231	52
9	9.1515694	8812	9.9955915	181	9.1559780	8993	10.8440220	51
10	9.1524507	8794	9.9955734	182	9.1568773	8975	10.8431227	50
11	9.1533301	8775	9.9955552	182	9.1577748	8958	10.8422252	49
12	9.1542076	8758	9.9955370	183	9.1586707	8940	10.8413294	48
13	9.1550834	8740	9.9955188	183	9.1595646	8923	10.8404354	47
14	9.1559574	8722	9.9955005	183	9.1604569	8905	10.8395431	46
15	9.1568296	8704	9.9954822	183	9.1613473	8888	10.8386527	45
16	9.1577000	8686	9.9954639	184	9.1622361	8870	10.8377639	44
17	9.1585686	8668	9.9954455	185	9.1631221	8852	10.8368769	43
18	9.1594354	8651	9.9954272	185	9.1640083	8835	10.8359917	42
19	9.1603005	8634	9.9954087	185	9.1648919	8818	10.8351081	41
20	9.1611639	8615	9.9953902	185	9.1657737	8801	10.8342263	40
21	9.1620254	8599	9.9953717	186	9.1666528	8784	10.8333462	39
22	9.1628853	8581	9.9953531	186	9.1675322	8767	10.8324678	38
23	9.1637434	8564	9.9953345	186	9.1684059	8750	10.8315911	37
24	9.1645998	8546	9.9953159	187	9.1692839	8733	10.8307161	36
25	9.1654544	8530	9.9952972	187	9.1701572	8717	10.8298428	35
26	9.1663074	8512	9.9952785	188	9.1710289	8700	10.8289711	34
27	9.1671586	8495	9.9952597	188	9.1718989	8683	10.8281011	33
28	9.1680081	8478	9.9952409	188	9.1727672	8666	10.8272228	32
29	9.1688559	8462	9.9952221	188	9.1736338	8650	10.8263662	31
30	9.1697021		9.9952033		9.1744988		10.8255012	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 81

Sinus			C. 8		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cor.	
30	9.1697021		9.9951033		9.1744988		10.8255012	30
		8444		189		8634		
31	9.1705465	8418	9.9951844	190	9.1753622	8617	10.8246378	29
32	9.1713893	8412	9.9951654	190	9.1762219	8601	10.8237761	28
33	9.1722305	8394	9.9951464	190	9.1770840	8585	10.8229160	27
34	9.1730699	8378	9.9951274	190	9.1779425	8568	10.8220575	26
35	9.1739077	8362	9.9951084	191	9.1787993	8552	10.8212007	25
36	9.1747439	8345	9.9950893	191	9.1796546	8536	10.8203454	24
37	9.1755784	8328	9.9950702	191	9.1805082	8520	10.8194918	23
38	9.1764112	8312	9.9950510	192	9.1813602	8504	10.8186398	22
39	9.1772425	8296	9.9950318	192	9.1822106	8489	10.8177894	21
40	9.1780721	8280	9.9950126	193	9.1830595	8473	10.8169405	20
41	9.1789001	8264	9.9949933	193	9.1839068	8457	10.8160932	19
42	9.1797265	8247	9.9949740	194	9.1847525	8441	10.8152475	18
43	9.1805512	8232	9.9949546	194	9.1855966	8426	10.8144034	17
44	9.1813744	8216	9.9949352	194	9.1864392	8410	10.8135608	16
45	9.1821960	8200	9.9949158	194	9.1872802	8394	10.8127198	15
46	9.1830160	8184	9.9948964	195	9.1881196	8379	10.8118804	14
47	9.1838344	8168	9.9948769	196	9.1889575	8364	10.8110425	13
48	9.1846512	8153	9.9948573	196	9.1897929	8348	10.8102061	12
49	9.1854665	8137	9.9948377	196	9.1906287	8334	10.8093713	11
50	9.1862802	8121	9.9948181	196	9.1914621	8318	10.8085379	10
51	9.1870923	8106	9.9947985	197	9.1922929	8202	10.8077061	9
52	9.1879029	8091	9.9947788	197	9.1931241	8188	10.8068759	8
53	9.1887120	8075	9.9947591	198	9.1939529	8273	10.8060471	7
54	9.1895195	8059	9.9947393	198	9.1947802	8257	10.8052198	6
55	9.1903254	8045	9.9947195	198	9.1956059	8242	10.8043941	5
56	9.1911299	8029	9.9946997	199	9.1964302	8228	10.8035698	4
57	9.1919328	8014	9.9946798	199	9.1972530	8212	10.8027470	3
58	9.1927342	7999	9.9946599	200	9.1980743	8198	10.8019257	2
59	9.1935341	7983	9.9946399	200	9.1988941	8184	10.8011059	1
60	9.1943224		9.9946199		9.1997125		10.8002875	0
	L. Cor.		L. Sin.		L. Cor.		L. Tan.	M

G. 81

SINUS

G. 9

Tangentes

M	L. Sin.	Diff	L. Cof.	D.	L. Tan.	D.co.	L. Cot.	
0	9.1943224		9.9246192		9.1997125		10.8002875	60
	—	7969	—	100	—	8169	—	—
1	9.1951297		9.9945999		9.2005294		10.7994706	59
2	9.1959247	7954	9.9945798	101	9.2013439	8155	10.7986551	58
3	9.1967186	7939	9.9945597	101	9.2021588	8140	10.7978411	57
4	9.1975110	7924	9.9945395	101	9.2029714	8125	10.7970286	56
5	9.1983019	7909	9.9945194	101	9.2037825	8111	10.7962175	55
6	9.1990913	7894	9.9944992	102	9.2045921	8097	10.7954078	54
7	9.1998792	7880	9.9944789	102	9.2054003	8082	10.7945996	53
8	9.2006658	7865	9.9944587	102	9.2062072	8068	10.7937928	52
9	9.2014502	7851	9.9944382	102	9.2070126	8054	10.7929874	51
10	9.2022345	7836	9.9944180	103	9.2078165	8039	10.7921835	50
	—	7822	—	105	—	8026	—	—
11	9.2030167		9.9943976		9.2086191		10.7913809	49
12	9.2037974	7807	9.9943771	105	9.2094223	8012	10.7905797	48
13	9.2045766	7792	9.9943566	105	9.2102200	7997	10.7897800	47
14	9.2053545	7779	9.9943361	105	9.2110184	7984	10.7889816	46
15	9.2061309	7764	9.9943156	105	9.2118152	7969	10.7881847	45
16	9.2069059	7750	9.9942950	106	9.2126109	7955	10.7873891	44
17	9.2076795	7736	9.9942742	107	9.2134051	7942	10.7865949	43
18	9.2084516	7721	9.9942537	106	9.2141980	7929	10.7858020	42
18	9.2092224	7708	9.9942330	107	9.2149894	7914	10.7850106	41
20	9.2099917	7692	9.9942122	108	9.2157795	7901	10.7842205	40
	—	7680	—	108	—	7888	—	—
21	9.2107597	7666	9.9941914	108	9.2165682		10.7834317	39
22	9.2115262	7651	9.9941706	108	9.2173556	7873	10.7826444	38
23	9.2122914	7638	9.9941498	109	9.2181417	7861	10.7818582	37
24	9.2130552	7624	9.9941289	110	9.2189264	7847	10.7810736	36
25	9.2138176	7611	9.9941079	109	9.2197097	7833	10.7802903	35
26	9.2145787	7597	9.9940870	111	9.2204917	7820	10.7795082	34
27	9.2153384	7582	9.9940659	110	9.2212724	7807	10.7787276	33
28	9.2160967	7569	9.9940449	111	9.2220518	7794	10.7779482	32
29	9.2168526	7556	9.9940238	111	9.2228298	7780	10.7771702	31
30	9.2176092		9.9940027		9.2236065	7767	10.7763935	30
	—	—	—	—	—	—	—	—
	L. Cof.		L. Sin.		L. Cot.		L. Tan.	M

G. 80

Sine			G. 9		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.
30	9.2176092		9.9940027		9.2236065		10.7763935
		7543		212		7754	
31	9.2183635		9.9939815		9.2243819		10.7756181
32	9.2191164	7529	9.9939603	212	9.2251561	7742	10.7748439
33	9.2198680	7516	9.9939391	212	9.2259289	7728	10.7740711
34	9.2206182	7502	9.9939178	213	9.2267004	7715	10.7732996
35	9.2213671	7489	9.9938965	213	9.2274706	7702	10.7725294
36	9.2221147	7476	9.9938752	213	9.2282395	7689	10.7717605
37	9.2228609	7462	9.9938538	214	9.2290071	7676	10.7709929
38	9.2236059	7450	9.9938324	214	9.2297725	7664	10.7702265
39	9.2243495	7436	9.9938109	215	9.2305386	7651	10.7694614
40	9.2250918	7423	9.9937894	215	9.2313024	7638	10.7686976
		7410		215		7626	
41	9.2258328		9.9937679		9.2320650		10.7679350
42	9.2265725	7397	9.9937462	216	9.2328262	7612	10.7671738
43	9.2273110	7385	9.9937247	216	9.2335863	7601	10.7664137
44	9.2280481	7371	9.9937030	217	9.2343451	7588	10.7656549
45	9.2287839	7358	9.9936813	217	9.2351026	7575	10.7648974
46	9.2295185	7346	9.9936596	217	9.2358589	7563	10.7641411
47	9.2302518	7333	9.9936378	218	9.2366139	7550	10.7633861
48	9.2309838	7320	9.9936160	218	9.2373678	7539	10.7626322
49	9.2317145	7307	9.9935942	218	9.2381203	7525	10.7618797
50	9.2324440	7295	9.9935723	219	9.2388717	7514	10.7611283
		7282		219		7501	
51	9.2331722		9.9935504		9.2396218		10.7603782
52	9.2338992	7270	9.9935285	219	9.2403708	7490	10.7596292
53	9.2346249	7257	9.9935065	220	9.2411185	7477	10.7588815
54	9.2353494	7245	9.9934844	221	9.2418650	7465	10.7581350
55	9.2360726	7232	9.9934624	220	9.2426103	7453	10.7573897
56	9.2367946	7220	9.9934403	221	9.2433543	7440	10.7566457
57	9.2375153	7207	9.9934181	222	9.2440972	7429	10.7559028
58	9.2382349	7196	9.9933959	222	9.2448389	7417	10.7551611
59	9.2389532	7183	9.9933737	222	9.2455794	7405	10.7544206
60	9.2396702	7170	9.9933515	222	9.2463188	7394	10.7536812
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 80

S

SINUS		G. 10			Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D co.	L. Cot.	
0	9.2396702		9.9933515		9.2463188		10.7536812	60
—	—	7159	—	123	—	7381	—	—
1	9.2403861	7146	9.9933292		9.2470569		10.7529431	59
2	9.2411007	7134	9.9933068	124	9.2477939	7370	10.7522061	58
3	9.2418141	7123	9.9932845	123	9.2485297	7358	10.7514703	57
4	9.2425264	7110	9.9932621	124	9.2492643	7346	10.7507357	56
5	9.2432374	7098	9.9932396	125	9.2499978	7335	10.7500022	55
6	9.2439472	7086	9.9932171	125	9.2507301	7323	10.7492699	54
7	9.2446558	7074	9.9931946	125	9.2514612	7311	10.7485388	53
8	9.2453622	7063	9.9931720	126	9.2521912	7300	10.7478088	52
9	9.2460695	7051	9.9931494	126	9.2529200	7288	10.7470800	51
10	9.2467746	7038	9.9931268	126	9.2536477	7277	10.7463523	50
—	—	7038	—	127	—	7266	—	—
11	9.2474784	7027	9.9931041	127	9.2543742	7254	10.7456257	49
12	9.2481811	7010	9.9930814	127	9.2550997	7243	10.7449003	48
13	9.2488827	7003	9.9930587	128	9.2558240	7232	10.7441760	47
14	9.2495830	6992	9.9930359	128	9.2565472	7220	10.7434528	46
15	9.2502822	6981	9.9930131	128	9.2572691	7209	10.7427308	45
16	9.2509803	6969	9.9929902	129	9.2579901	7198	10.7420099	44
17	9.2516772	6957	9.9929673	129	9.2587099	7186	10.7412901	43
18	9.2523729	6946	9.9929444	129	9.2594285	7176	10.7405715	42
19	9.2530675	6934	9.9929214	130	9.2601461	7164	10.7398529	41
20	9.2537609	6923	9.9928984	131	9.2608625	7154	10.7391375	40
—	—	6923	—	131	—	7154	—	—
21	9.2544532	6912	9.9928753	131	9.2615779	7142	10.7384221	39
22	9.2551444	6900	9.9928522	131	9.2622921	7132	10.7377079	38
23	9.2558344	6887	9.9928291	132	9.2630052	7120	10.7369947	37
24	9.2565233	6877	9.9928059	132	9.2637173	7110	10.7362827	36
25	9.2572110	6867	9.9927827	132	9.2644283	7099	10.7355717	35
26	9.2578977	6855	9.9927595	133	9.2651382	7088	10.7348618	34
27	9.2585832	6844	9.9927362	133	9.2658470	7077	10.7341530	33
28	9.2592676	6833	9.9927129	134	9.2665547	7066	10.7334453	32
29	9.2599509	6821	9.9926895	134	9.2672613	7056	10.7327387	31
30	9.2606330	—	9.9926661	—	9.2679669	—	10.7320331	30
—	—	—	—	—	—	—	—	—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			C. 10		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.
30	9.2606330		9.9926661		9.2679669		10.7320331
		6811		234		7045	
31	9.2613141		9.9926427		9.2686714		10.7313286
32	9.2619941	6800	9.9926192	235	9.2693749	7035	10.7306251
33	9.2626729	6788	9.9925957	235	9.2700771	7023	10.7299228
34	9.2633507	6778	9.9925722	235	9.2707786	7014	10.7292214
35	9.2640274	6767	9.9925486	236	9.2714788	7002	10.7285212
36	9.2647030	6756	9.9925250	236	9.2721780	6991	10.7278210
37	9.2653775	6745	9.9925013	237	9.2728762	6981	10.7271238
38	9.2660509	6734	9.9924776	237	9.2735733	6971	10.7264267
39	9.2667232	6723	9.9924539	237	9.2742694	6961	10.7257306
40	9.2673945	6713	9.9924301	238	9.2749644	6950	10.7250356
		6702		238		6940	
41	9.2680647	6691	9.9924063		9.2756584	6930	10.7243416
42	9.2687338	6681	9.9923824	239	9.2763514	6920	10.7236486
43	9.2694019	6670	9.9923585	239	9.2770434	6909	10.7229566
44	9.2700689	6659	9.9923346	239	9.2777343	6899	10.7222657
45	9.2707348	6649	9.9923106	240	9.2784242	6889	10.7215758
46	9.2713997	6638	9.9922866	240	9.2791131	6878	10.7208869
47	9.2720635	6628	9.9922626	240	9.2798009	6869	10.7201991
48	9.2727263	6617	9.9922385	241	9.2804878	6858	10.7195122
49	9.2733880	6607	9.9922144	241	9.2811736	6849	10.7188264
50	9.2740487		9.9921902	242	9.2818585		10.7181415
		6596		242		6838	
51	9.2747083	6586	9.9921660	242	9.2825423	6828	10.7174577
52	9.2753669	6576	9.9921418	243	9.2832251	6819	10.7167749
53	9.2760245	6566	9.9921175	243	9.2839070	6808	10.7160930
54	9.2766811	6555	9.9920932	243	9.2845878	6799	10.7154122
55	9.2773366	6545	9.9920689	244	9.2852677	6789	10.7147323
56	9.2779911	6534	9.9920445	244	9.2859466	6779	10.7140534
57	9.2786445	6524	9.9920201	245	9.2866245	6769	10.7133755
58	9.2792970	6514	9.9919956	245	9.2873014	6759	10.7126986
59	9.2799484	6504	9.9919711	245	9.2879773	6750	10.7120227
60	9.2805988		9.9919466		9.2886523		10.7113477
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G.79

G.79

Sinus			G. 11		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.2805988		9.9919466		9.2886523	6740	10.7113477	60
1	9.2812483	6495	9.9919220	246	9.2893263	6730	10.7106737	59
2	9.2818967	6484	9.9918974	246	9.2899993	6720	10.7100007	58
3	9.2825441	6474	9.9918727	247	9.2906713	6711	10.7093287	57
4	9.2831905	6464	9.9918480	247	9.2913424	6702	10.7086576	56
5	9.2838359	6454	9.9918233	247	9.2920126	6691	10.7079874	55
6	9.2844803	6444	9.9917986	247	9.2926817	6683	10.7073183	54
7	9.2851237	6434	9.9917737	249	9.2933500	6672	10.7066500	53
8	9.2857661	6424	9.9917489	248	9.2940172	6664	10.7059828	52
9	9.2864076	6415	9.9917240	249	9.2946836	6653	10.7053164	51
10	9.2870480	6404	9.9916991	249	9.2953489	6645	10.7046511	50
11	9.2876875	6395	9.9916741	250	9.2960134	6635	10.7039866	49
12	9.2883260	6385	9.9916492	249	9.2966769	6626	10.7033221	48
13	9.2889636	6376	9.9916241	251	9.2973395	6616	10.7026605	47
14	9.2896001	6365	9.9915990	251	9.2980011	6607	10.7019989	46
15	9.2902357	6356	9.9915739	251	9.2986618	6598	10.7013382	45
16	9.2908704	6347	9.9915488	251	9.2993216	6588	10.7006784	44
17	9.2915040	6336	9.9915236	252	9.2999804	6579	10.7000196	43
18	9.2921367	6327	9.9914984	252	9.3006383	6571	10.6993617	42
19	9.2927685	6318	9.9914731	253	9.3012954	6560	10.6987046	41
20	9.2933993	6308	9.9914478	253	9.3019514	6552	10.6980486	40
21	9.2940291	6298	9.9914225	253	9.3026066	6543	10.6973934	39
22	9.2946580	6289	9.9913971	254	9.3032609	6534	10.6967391	38
23	9.2952859	6279	9.9913717	255	9.3039143	6524	10.6960857	37
24	9.2959129	6270	9.9913462	255	9.3045667	6516	10.6954333	36
25	9.2965390	6261	9.9913207	255	9.3052183	6506	10.6947817	35
26	9.2971641	6251	9.9912952	255	9.3058689	6498	10.6941311	34
27	9.2977883	6242	9.9912696	256	9.3065187	6488	10.6934813	33
28	9.2984116	6233	9.9912440	256	9.3071674	6480	10.6928325	32
29	9.2990339	6223	9.9912184	257	9.3078155	6471	10.6921845	31
30	9.2996553	6214	9.9911927		9.3084626		10.6915374	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 78

Sinus				G. 11				Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.				
30	9.2996553	6205	9.9911927	257	9.3084626	6462	10.6915374	30			
31	9.3002758	6195	9.9911670	258	9.3091088	6453	10.6908912	29			
32	9.3008953	6187	9.9911412	258	9.3097541	6444	10.6802459	28			
33	9.3015140	6177	9.9911154	258	9.3103985	6436	10.6896015	27			
34	9.3021317	6168	9.9910896	259	9.3110421	6427	10.6889579	26			
35	9.3027485	6159	9.9910637	259	9.3116848	6418	10.6883152	25			
36	9.3033644	6150	9.9910378	259	9.3123266	6409	10.6876734	24			
37	9.3039794	6140	9.9910119	260	9.3129675	6401	10.6870325	23			
38	9.3045934	6132	9.9909859	261	9.3136078	6392	10.6863924	22			
39	9.3052066	6123	9.9909598	260	9.3142468	6383	10.6857532	21			
40	9.3058189	6114	9.9909338	261	9.3148851	6375	10.6851149	20			
41	9.3064303	6104	9.9909077	262	9.3155226	6366	10.6844774	19			
42	9.3070407	6095	9.9908815	262	9.3161592	6358	10.6838408	18			
43	9.3076503	6087	9.9908553	262	9.3167950	6349	10.6832050	17			
44	9.3082590	6078	9.9908291	262	9.3174299	6341	10.6825701	16			
45	9.3088668	6069	9.9908029	263	9.3180640	6332	10.6819360	15			
46	9.3094737	6061	9.9907766	264	9.3186972	6323	10.6813028	14			
47	9.3100798	6051	9.9907502	263	9.3193295	6316	10.6806705	13			
48	9.3106849	6043	9.9907239	265	9.3199611	6307	10.6800389	12			
49	9.3112892	6034	9.9906974	264	9.3205918	6298	10.6794082	11			
50	9.3118926	6025	9.9906710	265	9.3212216	6290	10.6787784	10			
51	9.3124951	6017	9.9906445	265	9.3218506	6282	10.6781494	9			
52	9.3130968	6008	9.9906180	266	9.3224788	6273	10.6775212	8			
53	9.3136976	5999	9.9905914	266	9.3231061	6266	10.6768939	7			
54	9.3142975	5990	9.9905648	266	9.3237327	6257	10.6762673	6			
55	9.3148965	5982	9.9905382	267	9.3243584	6248	10.6756416	5			
56	9.3154947	5974	9.9905115	267	9.3249832	6241	10.6750168	4			
57	9.3160921	5964	9.9904848	268	9.3256073	6232	10.6743927	3			
58	9.3166885	5956	9.9904580	268	9.3262305	6224	10.6737695	2			
59	9.3172841	5948	9.9904312	268	9.3268529	6216	10.6731371	1			
60	9.3178789		9.9904044		9.3274745		10.6725255	0			
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M			

G. 78

Sinus			G. 2		Tangentēs		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
0	9.3178789		9.9904044		9.3274745		10.6725255
1		5939		269		6208	
2	9.3184228	5921	9.9903775	269	9.3280953	6200	10.6719047
3	9.3190659	5912	9.9903506	269	9.3287153	6192	10.6712847
4	9.3196581	5914	9.9903237	270	9.329345	6183	10.6706655
5	9.3202495	5905	9.9902967	270	9.3299528	6176	10.6700472
6	9.3208400	5897	9.9902697	271	9.3305704	6168	10.6694296
7	9.3214297	5889	9.9902426	271	9.3311871	6159	10.6688128
8	9.3220186	5880	9.9902155	272	9.3318021	6152	10.6681969
9	9.3226066	5872	9.9901883	272	9.3324182	6144	10.6675817
10	9.3231928	5864	9.9901612	273	9.3330227	6136	10.6669672
11	9.3237802	5855	9.9901339	273	9.3336463	6128	10.6663537
12				272			
13	9.3243657	5849	9.9901067	273	9.3342591	6120	10.6657409
14	9.3249505	5839	9.9900794	273	9.3348711	6112	10.6651289
15	9.3255344	5830	9.9900521	274	9.3354823	6104	10.6645177
16	9.3261174	4823	9.9900247	274	9.3360927	6097	10.6639072
17	9.3266997	5814	9.9899972	275	9.3367024	6089	10.6632976
18	9.3272811	5806	9.9899698	275	9.3373113	6081	10.6626887
19	9.3278617	5799	9.9899422	276	9.3379194	6073	10.6620806
20	9.3284416	5790	9.9899148	276	9.3385267	6066	10.6614723
21	9.3290206	5782	9.9898873	276	9.3391333	6058	10.6608667
22	9.3295988	5773	9.9898597	277	9.3397391	6050	10.6602609
23				277			
24	9.3301761	5765	9.9898320	277	9.3403441	6043	10.6596559
25	9.3307527	5758	9.9898042	277	9.3409484	6035	10.6590516
26	9.3313285	5750	9.9897766	277	9.3415519	6027	10.6584481
27	9.3319035	5742	9.9897489	278	9.3421546	6020	10.6578454
28	9.3324777	5734	9.9897211	279	9.3427566	6012	10.6572424
29	9.3330511	5726	9.9896932	278	9.3433578	6005	10.6566422
30	9.3336237	5718	9.9896654	280	9.3439582	5997	10.6560417
31	9.3341955	5710	9.9896374	279	9.3445580	5990	10.6554420
32	9.3347665	5703	9.9896095	280	9.3451570	5982	10.6548420
33	9.3353368		9.9895815		9.3457552		10.6542448
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	L. Cos.		L. Sin.		L. Cot.		L. Tan.

Sinus			G. 12		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.3353368		9.9895815		9.3457552		10.6542448	30
		5694		180		5975		
31	9.3359062		9.9895533		9.3463527		10.6536473	29
32	9.3364749	5687	9.9895254	181	9.3469494	5967	10.6530506	28
33	9.3370428	5679	9.9894973	181	9.3475454	5960	10.6524546	27
34	9.3376099	5671	9.9894692	182	9.3481407	5952	10.6518592	26
35	9.3381762	5662	9.9894410	182	9.3487352	5945	10.6512628	25
36	9.3387418	5656	9.9894128	182	9.3493290	5938	10.6506710	24
37	9.3393065	5647	9.9893845	183	9.3499227	5930	10.6500780	23
38	9.3398706	5641	9.9893562	183	9.3505142	5923	10.6494857	22
39	9.3404338	5632	9.9893279	183	9.3511050	5916	10.6488941	21
40	9.3409963	5625	9.9892995	184	9.3516968	5909	10.6483032	20
		5617		184		5901		
41	9.3415580		9.9892711	184	9.3522869		10.6477131	19
42	9.3421190	5610	9.9892427	185	9.3528763	5894	10.6471227	18
43	9.3426792	5602	9.9892142	185	9.3534650	5887	10.6465320	17
44	9.3432386	5594	9.9891856	185	9.3540532	5880	10.6459410	16
45	9.3437973	5587	9.9891571	186	9.3546402	5872	10.6453508	15
46	9.3443552	5579	9.9891285	186	9.3552267	5865	10.6447723	14
47	9.3449124	5572	9.9890998	187	9.3558126	5859	10.6441874	13
48	9.3454688	5564	9.9890711	187	9.3563977	5851	10.6436022	12
49	9.3460245	5557	9.9890424	187	9.3569821	5844	10.6430179	11
50	9.3465794	5549	9.9890137	187	9.3575658	5837	10.6424342	10
		5542		188		5829		
51	9.3471336	5534	9.9889849	189	9.3581487	5823	10.6418512	9
52	9.3476870	5527	9.9889560	189	9.3587310	5816	10.6412690	8
53	9.3482397	5520	9.9889271	189	9.3593126	5809	10.6406874	7
54	9.3487917	5512	9.9888982	189	9.3598935	5801	10.6401065	6
55	9.3493429	5505	9.9888693	190	9.3604736	5795	10.6395264	5
56	9.3498934	5498	9.9888403	190	9.3610531	5788	10.6389469	4
57	9.3504432	5490	9.9888113	191	9.3616319	5781	10.6383681	3
58	9.3509922	5482	9.9887822	191	9.3622100	5774	10.6377900	2
59	9.3515405	5485	9.9887531	192	9.3627874	5767	10.6372126	1
50	9.3520880		9.9887239		9.3633641		10.6366359	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M
G. 77								

G. 77

Sinus			G. 13		Tangentes		
M	L.Sin.	Diff.	L.Cof.	D.	L.Tan.	D.co.	L. Cor.
0	9.3520880		9.9887239		9.3633641		10.6366359 60
—	—	5469	—	292	—	5760	—
1	9.3526349		9.9886947		9.3639401	5754	10.6360599 59
2	9.3531810	5461	9.9886655	292	9.3645155	5746	10.6354845 58
3	9.3537264	5454	9.9886363	292	9.3650901	5740	10.6349099 57
4	9.3542710	5446	9.9886070	293	9.3656641	5733	10.6343359 56
5	9.3548150	5440	9.9885776	294	9.3662374	5726	10.6337626 55
6	9.3553582	5432	9.9885482	294	9.3668100	5719	10.6331900 54
7	9.3559007	5425	9.9885188	294	9.3673819	5713	10.6326181 53
8	9.3564426	5419	9.9884894	294	9.3679532	5706	10.6320468 52
9	9.3569836	5410	9.9884599	295	9.3685238	5699	10.6314762 51
10	9.3575240	5404	9.9884303	296	9.3690937		10.6309063 50
—	—	5397	—	295	—	5692	—
11	9.3580637		9.9884008		9.3696629	5686	10.6303371 49
12	9.3586027	5390	9.9883712	296	9.3702315	5677	10.6297685 48
13	9.3591409	5382	9.9883415	297	9.3707994	5673	10.6292006 47
14	9.3596785	5376	9.9883118	297	9.3713667	5666	10.6286333 46
15	9.3602154	5469	9.9882821	297	9.3719333	5659	10.6280667 45
16	9.3607515	5361	9.9882523	298	9.3724992	5653	10.6275008 44
17	9.3612870	5355	9.9882225	298	9.3730645	5646	10.6269355 43
18	9.3618217	5347	9.9881927	298	9.3736291	5639	10.6263709 42
19	9.3623558	5341	9.9881628	299	9.3741930	5633	10.6258070 41
20	9.3628892	5334	9.9881329	299	9.3747563		10.6252437 40
—	—	5327	—	300	—	5627	—
21	9.3634219		9.9881029		9.3753190	5620	10.6246810 39
22	9.3639529	5320	9.9880729	300	9.3758810	5613	10.6241190 38
23	9.3644852	5313	9.9880429	301	9.3764423	5607	10.6235577 37
24	9.3650158	5306	9.9880128	301	9.3770030	5601	10.6229970 36
25	9.3655458	5300	9.9879827	302	9.3775631	5594	10.6224369 35
26	9.3660750	5292	9.9879525	302	9.3781225	5588	10.6218775 34
27	9.3666026	5286	9.9879223	302	9.3786813	5581	10.6213187 33
28	9.3671215	5275	9.9878921	303	9.3792394	5575	10.6207606 32
29	9.3676587	5272	9.9878618	303	9.3797969	5568	10.6202031 31
30	9.3681853	5266	9.9878315	303	9.3803537		10.6196463 30
—	—	—	—	—	—	—	—
	L. Cof.		L. Sin.		L. Cor.		L. Tan. M

Sinus

Gr. 13

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.3681853		9.9878315		9.3803537		10.6196463	30
		5258		303		5563		
31	9.3687111		9.9878012		9.3809100		10.6160900	29
		5252		304		5555		
32	9.3692367		9.9877708		9.3814655		10.6185745	28
		5245		304		5550		
33	9.3697608		9.9877304		9.3820205		10.6179795	27
		5239		305		5543		
34	9.3702847		9.9877099		9.3825748		10.6174252	26
		5232		305		5537		
35	9.3708079		9.9876794		9.3831285		10.6168715	25
		5225		306		5531		
36	9.3713304		9.9876488		9.3836816		10.6163184	24
		5219		305		5524		
37	9.3718523		9.9876182		9.3842347		10.6157660	23
		5212		307		5518		
38	9.3723735		9.9875876		9.3847858		10.6152142	22
		5205		306		5512		
39	9.3728940		9.9875570		9.3853370		10.6146630	21
		5199		307		5506		
40	9.3734139		9.9875263		9.3858876		10.6141124	20
		5192		308		5500		
41	9.3739331		9.9874955		9.3864376		10.6135624	19
		5186		307		5493		
42	9.3744517		9.9874648		9.3869869		10.6130124	18
		5181		309		5487		
43	9.3749696		9.9874339		9.3875356		10.6124624	17
		5172		308		5481		
44	9.3754868		9.9874031		9.3880837		10.6119163	16
		5166		309		5475		
45	9.3760034		9.9873722		9.3886312		10.6113688	15
		5160		309		5469		
46	9.3765194		9.9873413		9.3891781		10.6108219	14
		5153		310		5462		
47	9.3770357		9.9873103		9.3897244		10.6102756	13
		5145		310		5456		
48	9.3775549		9.9872793		9.3902700		10.6097300	12
		5140		311		5451		
49	9.3780633		9.9872482		9.3908151		10.6091849	11
		5134		311		5444		
50	9.3785767		9.9872171		9.3913595		10.6086405	10
		5127		311		5439		
51	9.3790894		9.9871860		9.3919034		10.6080966	9
		5121		311		5432		
52	9.3796015		9.9871549		9.3924466		10.6075534	8
		5114		312		5427		
53	9.3801129		9.9871236		9.3929893		10.6070107	7
		5108		312		5420		
54	9.3806237		9.9870924		9.3935313		10.6064687	6
		5102		312		5414		
55	9.3811339		9.9870611		9.3940727		10.6059273	5
		5095		313		5409		
56	9.3816434		9.9870298		9.3946136		10.6053864	4
		5089		314		5402		
57	9.3821523		9.9869984		9.3951538		10.6048462	3
		5082		314		5397		
58	9.3826605		9.9869670		9.3956935		10.6043054	2
		5077		314		5391		
59	9.3831682		9.9869356		9.3962326		10.6037670	1
		5070		315		5385		
60	9.3836752		9.9869041		9.3967711		10.6032289	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	

C. 76.

T

SINUS

G. 14.

TANGENTES

M	L.Sin.	Diff.	L.Cof.	D.	L.Tan.	D.co.	L.Cot.	
30	9.3985996		9.9859416		9.4126581		10.5873419	30
		4882		327		5208		
31	9.3990878		9.9859089		9.4131789		10.5868211	29
		4876		327		5204		
32	9.3995754		9.9858762		9.4136992		10.5862007	28
		4871		328		5198		
33	9.4000625		9.9858422		9.4142191		10.5857809	27
		4864		328		5192		
34	9.4005489		9.9858106		9.4147382		10.5852617	26
		4859		329		5187		
35	9.4010348		9.9857777		9.4152570		10.5847430	25
		4853		328		5182		
36	9.4015201		9.9857449		9.4157752		10.5842248	24
		4847		330		5176		
37	9.4020048		9.9857119		9.4162928		10.5837072	23
		4841		330		5171		
38	9.4024889		9.9856790		9.4168099		10.5831901	22
		4835		330		5166		
39	9.4029734		9.9856460		9.4173265		10.5826735	21
		4820		331		5160		
40	9.4034554		9.9856129		9.4178425		10.5821575	20
		4814		331		5155		
41	9.4039378		9.9855798		9.4183580		10.5816420	19
		4818		331		5149		
42	9.4044196		9.9855467		9.4188729		10.5811271	18
		4813		332		5145		
43	9.4049009		9.9855135		9.4193874		10.5806126	17
		4807		332		5139		
44	9.4053816		9.9854803		9.4199013		10.5800987	16
		4801		332		5133		
45	9.4058617		9.9854471		9.4204146		10.5795854	15
		4795		332		5129		
46	9.4063412		9.9854138		9.4209275		10.5790725	14
		4790		333		5123		
47	9.4068202		9.9853805		9.4214398		10.5785602	13
		4784		334		5117		
48	9.4072987		9.9853471		9.4219515		10.5780485	12
		4779		334		5113		
49	9.4077766		9.9853138		9.4224628		10.5775372	11
		4773		335		5107		
50	9.4082539		9.9852803		9.4229735		10.5770265	10
		4767		335		5103		
51	9.4087306		9.9852468		9.4234838		10.5765162	9
		4762		335		5097		
52	9.4092068		9.9852133		9.4239925		10.5760065	8
		4756		335		5091		
53	9.4096822		9.9851798		9.4245026		10.5754974	7
		4751		336		5087		
54	9.4101575		9.9851462		9.4250113		10.5749887	6
		4745		337		5081		
55	9.4106320		9.9851125		9.4255194		10.5744806	5
		4739		336		5077		
56	9.4111059		9.9850789		9.4260271		10.5739729	4
		4734		337		5071		
57	9.4115792		9.9850452		9.4265342		10.5734658	3
		4729		338		5066		
58	9.4120522		9.9850114		9.4270408		10.5729592	2
		4723		338		5061		
59	9.4125245		9.9849776		9.4275469		10.5724521	1
		4717		338		5056		
60	9.4129962		9.9849439		9.4280525		10.5719475	0
	L.Cof.		L.Sin.		L.Cot.		L.Tan.	M

G. 75.

T 2

Sine			C. 15.		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
0	9.4129962		9.9849438		9.4180525		10.5719475
		4714		339		5050	
1	9.4134674	4707	9.9849099	339	9.4185575		10.5714425
2	9.4139181	4701	9.9848760	340	9.4190521	5046	10.5709379
3	9.4143682	4695	9.9848420	340	9.4195461	5040	10.5704329
4	9.4148178	4690	9.9848081	341	9.4200407	5036	10.5700279
5	9.4152666	4684	9.9847740	340	9.4205357	5030	10.5696229
6	9.4157152	4680	9.9847400	341	9.4210303	5026	10.5692179
7	9.4161632	4680	9.9847059	341	9.4215252	5020	10.5688127
8	9.4166106	4673	9.9846717	342	9.4220200	5016	10.5684075
9	9.4170574	4668	9.9846375	342	9.4225149	5010	10.5680021
10	9.4175037	4663	9.9846032	342	9.4230094	5005	10.5675966
		4658		343		5001	
11	9.4181495	4653	9.9845690	343	9.4235040	4995	10.5671915
12	9.4186118	4647	9.9845347	343	9.4240080	4991	10.5667860
13	9.4190795	4641	9.9845004	343	9.4245121	4985	10.5663809
14	9.4195436	4637	9.9844660	444	9.4250166	4981	10.5659754
15	9.4200073	4631	9.9844316	344	9.4255213	4976	10.5655703
16	9.4204704	4626	9.9843971	345	9.4260262	4971	10.5651652
17	9.4209330	4620	9.9843626	345	9.4265312	4966	10.5647603
18	9.4213950	4616	9.9843281	345	9.4270363	4961	10.5643554
19	9.4218566	4610	9.9842935	346	9.4275414	4956	10.5639505
20	9.4223176		9.9842589	346	9.4280467	4951	10.5635456
		4604		347		4947	
21	9.4227780	4600	9.9842242	347	9.4285521	4941	10.5631407
22	9.4232380	4594	9.9841895	347	9.4290576	4941	10.5627358
23	9.4236975	4589	9.9841548	348	9.4295631	4937	10.5623309
24	9.4241563	4584	9.9841200	348	9.4300686	4932	10.5619260
25	9.4246147	4579	9.9840852	349	9.4305741	4927	10.5615211
26	9.4250726	4573	9.9840503	349	9.4310796	4923	10.5611162
27	9.4255299	4568	9.9840154	349	9.4315851	4917	10.5607113
28	9.4259867	4562	9.9839805	350	9.4320906	4912	10.5603064
29	9.4264430	4558	9.9839455	350	9.4325961	4908	10.5599015
30	9.4268988	4553	9.9839105		9.4331016		10.5594966
	L. Cos.		L. Sin.		L. Cot.		L. Tan.
							M

Sinus			G. 15		Tangentes			
Nl	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9 4268988		9 9839105	1	9 4429883		10 5570117	30
		4553		350		4203		
31	9 4272241		9 9838755		9 4424786		10 5565214	29
32	9 4278089	4548	9 9838404	351	9 4429685	4899	10 5560315	28
33	9 4282621	4542	9 9838052	352	9 4434579	4894	10 5555421	27
34	9 4287169	4538	9 9837701	351	9 4439458	4889	10 5550532	26
35	9 4291701	4532	9 9837348	353	9 4444352	4884	10 5545643	25
36	9 4296228	4527	9 9836996	352	9 4449222	4880	10 5540768	24
37	9 4300750	4522	9 9836643	352	9 4454107	4875	10 5535893	23
38	9 4305267	4517	9 9836290	353	9 4458978	4871	10 5531022	22
39	9 4309779	4512	9 9835926	354	9 4463843	4865	10 5526157	21
40	9 4314286	4507	9 9835582	353	9 4468704	4861	10 5521296	20
		4502		355		4857		
41	9 4318758	4497	9 9835227	355	9 4473561	4852	10 5516429	19
42	9 4323285	4492	9 9834872	355	9 4478412	4847	10 5511587	18
43	9 4327777	4487	9 9834517	356	9 4483260	4842	10 5506740	17
44	9 4332264	4482	9 9834161	356	9 4488102	4838	10 5501898	16
45	9 4336746	4477	9 9833805	356	9 4492940	4834	10 5497060	15
46	9 4341222	4471	9 9833449	357	9 4497774	4828	10 5492226	14
47	9 4345693	4465	9 9833092	357	9 4502602	4825	10 5487398	13
48	9 4350161	4462	9 9832735	358	9 4507427	4819	10 5482573	12
49	9 4354622	4457	9 9832377	358	9 4512246	4815	10 5477754	11
50	9 4359080	4452	9 9832019	358	9 4517061	4811	10 5472939	10
		4448		359				
51	9 4363522	4448	9 9831661	359	9 4521872	4806	10 5368128	9
52	9 4367980	4442	9 9831302	360	9 4526678	4801	10 5463322	8
53	9 4372422	4437	9 9830942	359	9 4531479	4797	10 5458521	7
54	9 4376859	4432	9 9830583	360	9 4536276	4792	10 5453724	6
55	9 4381292	4427	9 9830223	361	9 4541069	4788	10 5448931	5
56	9 4385719	4422	9 9829862	361	9 4545857	4784	10 5444143	4
57	9 4390142	4418	9 9829501	361	9 4550641	4779	10 5439359	3
58	9 4394560	4413	9 9829140	362	9 4555420	4774	10 5434580	2
59	9 4398973	4408	9 9828778	362	9 4560194	4770	10 5429806	1
60	9 4403381		9 9828416		9 4564964		10 5425036	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 74

Sinus			G. 16		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.4403381		9.9828416		9.4574964		10.5425036	60
1	9.4407784	4403	9.9828054	362	9.4579730	4766	10.5420270	59
2	9.4412182	4398	9.9827691	363	9.4584491	4761	10.5415509	58
3	9.4416576	4394	9.9827328	363	9.4589248	4757	10.5410752	57
4	9.4420970	4389	9.9826964	364	9.4594001	4752	10.5405999	56
5	9.4425364	4384	9.9826600	364	9.4598749	4748	10.5401251	55
6	9.4429758	4379	9.9826236	364	9.4603492	4743	10.5396508	54
7	9.4434153	4375	9.9825871	365	9.4608232	4740	10.5391768	53
8	9.4438547	4369	9.9825506	365	9.4612967	4735	10.5387023	52
9	9.4442937	4365	9.9825140	366	9.4617697	4730	10.5382280	51
10	9.4447197	4360	9.9824774	466	9.4622423	4726	10.5377577	50
		4356		366		4722		
11	9.4451553	4351	9.9824408	367	9.4627145	4718	10.5372855	49
12	9.4455904	4346	9.9824041	367	9.4631863	4713	10.5368137	48
13	9.4460250	4341	9.9823674	368	9.4636576	4709	10.5363424	47
14	9.4464591	4336	9.9823306	368	9.4641285	4705	10.5358715	46
15	9.4468927	4332	9.9822938	369	9.4645990	4700	10.5354010	45
16	9.4473259	4327	9.9822569	368	9.4650690	4696	10.5349310	44
17	9.4477586	4322	9.9822201	368	9.4655386	4692	10.5344614	43
18	9.4481909	4318	9.9821831	370	9.4660078	4687	10.5339922	42
19	9.4486227	4313	9.9821462	369	9.4664765	4683	10.5335235	41
20	9.4490540		9.9821092	370	9.4669448		10.5330552	40
		4309		371		4679		
21	9.4494849	4304	9.9820721	370	9.4674127	4675	10.5325872	39
22	9.4499153	4299	9.9820351	372	9.4678802	4671	10.5321198	38
23	9.4503452	4295	9.9819979	371	9.4683473	4666	10.5316527	37
24	9.4507747	4290	9.9819608	372	9.4688139	4662	10.5311861	36
25	9.4512037	4285	9.9819236	373	9.4692801	4658	10.5307199	35
26	9.4516322	4281	9.9818863	373	9.4697459	4653	10.5302541	34
27	9.4520602	4276	9.9818490	373	9.4702112	4650	10.5297888	33
28	9.4524879	4272	9.9818117	373	9.4706762	4645	10.5293238	32
29	9.4529151	4267	9.9817744	373	9.4711407	4641	10.5288593	31
30	9.4533418		9.9817370	374	9.4716048		10.5283952	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 73.

Sinus

G. 16

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.4533418		9.9817370		9.4716038		10.5283952	30
—	—	4263	—	375	—	4637	—	—
31	9.4537681	4258	9.9816995	375	9.4720685	4632	10.5279315	29
32	9.4541939	4253	9.9816620	375	9.4725318	4629	10.5274682	28
33	9.4546192	4249	9.9816245	375	9.4729947	4625	10.5270052	27
34	9.4550441	4245	9.9815870	376	9.4734571	4620	10.5265428	26
35	9.4554686	4240	9.9815494	377	9.4739192	4616	10.5260808	25
36	9.4558926	4235	9.9815117	377	9.4743808	4612	10.5256192	24
37	9.4563161	4231	9.9814740	377	9.4748421	4608	10.5251579	23
38	9.4567392	4226	9.9814362	377	9.4753029	4604	10.5246971	22
39	9.4571618	4222	9.9813986	378	9.4757633	4600	10.5242367	21
40	9.4575840	—	9.9813608	379	9.4762233	—	10.5237767	20
—	—	4218	—	379	—	4596	—	—
41	9.4580058	4213	9.9813229	379	9.4766829	4592	10.5233171	19
42	9.4584271	4209	9.9812850	379	9.4771421	4588	10.5228579	18
43	9.4588480	4204	9.9812471	380	9.4776009	4583	10.5223991	17
44	9.4592684	4200	9.9812091	380	9.4780592	4580	10.5219408	16
45	9.4596884	4195	9.9811711	380	9.4785172	4576	10.5214828	15
46	9.4601079	4191	9.9811331	381	9.4789748	4571	10.5210252	14
47	9.4605270	4186	9.9810950	381	9.4794319	4568	10.5205681	13
48	9.4609456	4182	9.9810569	382	9.4798887	4564	10.5201113	12
49	9.4613628	4178	9.9810187	382	9.4803451	4560	10.5196549	11
50	9.4617816	—	9.9809805	382	9.4808011	—	10.5191989	10
—	—	4173	—	382	—	4555	—	—
51	9.4621989	4169	9.9809423	382	9.4812566	4552	10.5187424	9
52	9.4626158	4165	9.9809040	383	9.4817118	4548	10.5182882	8
53	9.4630323	4160	9.9808657	384	9.4821666	4544	10.5178334	7
54	9.4634483	4156	9.9808273	384	9.4826210	4540	10.5173790	6
55	9.4638639	4151	9.9807889	384	9.4830750	4536	10.5169250	5
56	9.4642790	4148	9.9807505	385	9.4835286	4532	10.5164714	4
57	9.4646938	4143	9.9807120	385	9.4839818	4528	10.5160182	3
58	9.4651081	4138	9.9806735	386	9.4844346	4524	10.5155654	2
59	9.4655219	4134	9.9806349	386	9.4848870	4520	10.5151130	1
60	9.4659353	—	9.9805963	386	9.4853390	—	10.5146610	0
—	—	—	—	—	—	—	—	M
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	

Sinus			G. 17		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
0	9.4659353		9.9805963		9.4853390		10.5146610
		4130		386		4517	
1	9.4663483	4126	9.9805577	387	9.4857907	4512	10.5142092
2	9.4667609	4121	9.9805190	387	9.4862419	4509	10.5137581
3	9.4671730	4118	9.9804803	388	9.4866928	4505	10.5133072
4	9.4675848	4112	9.9804415	388	9.4871433	4500	10.5128567
5	9.4679960	4109	9.9804027	388	9.4875933	4497	10.5124057
6	9.4684069	4104	9.9803639	389	9.4880430	4494	10.5119570
7	9.4688173	4100	9.9803250	390	9.4884924	4489	10.5115076
8	9.4692273	4096	9.9802860	389	9.4889413	4485	10.5110587
9	9.4696369	4092	9.9802471	390	9.4893898	4482	10.5106102
10	9.4700461		9.9802081	390	9.4898380		10.5101623
		4087		391		4478	
11	9.4704548	4083	9.9801690	391	9.4902858	4474	10.5097142
12	9.4708631	4079	9.9801299	391	9.4907332	4470	10.5092668
13	9.4712710	4075	9.9800908	392	9.4911802	4467	10.5088198
14	9.4716785	4071	9.9800516	392	9.4916269	4462	10.5083721
15	9.4720856	4066	9.9800124	392	9.4920721	4459	10.5079269
16	9.4724922	4063	9.9799732	392	9.4925190	4456	10.5074810
17	9.4728985	4058	9.9799339	392	9.4929646	4451	10.5070354
18	9.4733043	4054	9.9798946	392	9.4934097	4448	10.5065903
19	9.4737097	4049	9.9798552	394	9.4938545	4443	10.5061455
20	9.4741146		9.9798158	394	9.4942988		10.5057012
		4046		394		4441	
21	9.4745192	4042	9.9797764	395	9.4947429	4436	10.5052571
22	9.4749234	4037	9.9797369	396	9.4951865	4433	10.5048135
23	9.4753271	4033	9.9796973	395	9.4956308	4429	10.5043702
24	9.4757304	4030	9.9796578	396	9.4960727	4425	10.5039273
25	9.4761334	4025	9.9796182	397	9.4965152	4422	10.5034848
26	9.4765359	4021	9.9795785	397	9.4969574	4417	10.5030426
27	9.4769380	4016	9.9795388	397	9.4973991	4415	10.5026009
28	9.4773396	4413	9.9794991	398	9.4978406	4410	10.5021594
29	9.4777409	4009	9.9794593	398	9.4982816	4407	10.5017184
30	9.4781418		9.9794195		9.4987223		10.5012777
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 72

Sinus			G. 17			Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.4781418		9.9794195		9.4987223		10.5012777	30
		4005		399		4403		
31	9.4785423		9.9793796		9.4991616		10.5008374	29
32	9.4789423	4000	9.9793398	398	9.4996016	4400	10.5003974	28
33	9.4793420	3997	9.9792998	400	9.5000312	4396	10.4999578	27
34	9.4797412	3992	9.9792599	399	9.5004814	4392	10.4995186	26
35	9.4801401	3989	9.9792198	401	9.5009202	4389	10.4990797	25
36	9.4805385	3984	9.9791798	400	9.5013588	4385	10.4986412	24
37	9.4809366	3981	9.9791397	401	9.5017969	4381	10.4982031	23
38	9.4813342	3976	9.9790996	401	9.5022347	4378	10.4977653	22
39	9.4817315	3973	9.9790594	402	9.5026721	4374	10.4973279	21
40	9.4821283	3968	9.9790192	402	9.5031092	4371	10.4968908	20
		3965		403		4367		
41	9.4825248	3960	9.9789789	403	9.5035459	4363	10.4964541	19
42	9.4829208	3957	9.9789386	403	9.5039822	4360	10.4960178	18
43	9.4833165	3952	9.9788983	404	9.5044182	4356	10.4955818	17
44	9.4837117	3949	9.9788579	405	9.5048538	4353	10.4951462	16
45	9.4841066	3944	9.9788175	405	9.5052891	4349	10.4947109	15
46	9.4845010	3941	9.9787770	405	9.5057240	4346	10.4942760	14
47	9.4848951	3937	9.9787365	405	9.5061586	4342	10.4938414	13
48	9.4852888	3932	9.9786960	406	9.5065928	4339	10.4934072	12
49	9.4856820	3929	9.9786554	406	9.5070267	4335	10.4929732	11
50	9.4860749	3925	9.9786148	407	9.5074602	4331	10.4925398	10
		3921		407		4328		
51	9.4864674	3917	9.9785741	407	9.5078933	4325	10.4921067	9
52	9.4868595	3914	9.9785334	408	9.5083261	4322	10.4916739	8
53	9.4872512	3907	9.9784927	408	9.5087586	4317	10.4912414	7
54	9.4876426	3905	9.9784519	409	9.5091907	4315	10.4908093	6
55	9.4880335	3902	9.9784111	409	9.5096224	4310	10.4903776	5
56	9.4884240	3898	9.9783702	410	9.5100539	4307	10.4899461	4
57	9.4888142	3894	9.9783293	410	9.5104849	4304	10.4895151	3
58	9.4892040	3890	9.9782883	411	9.5109156	4300	10.4890844	2
59	9.4895934		9.9782474		9.5113460		10.4886540	1
60	9.4899824		9.9782066		9.5117760		10.4882240	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 72

U

Sine			Cos			Tangentes		
M	L. Sin.	Diff	L. Cos.	D.	L. Tan.	Sec.	L. Cot.	
0	9.4899824		9.9782063		9.5117760		10.4882140	60
		3886		410		4297		
1	9.4902710	3882	9.9781653		9.5122057		10.4877943	59
2	9.4907592	3879	9.9781241	412	9.5126351	4294	10.4873649	58
3	9.4911471	3874	9.9780830	411	9.5130641	4290	10.4869359	57
4	9.4915345	3871	9.9780418	412	9.5134927	4286	10.4865073	56
5	9.4919216	3867	9.9780006	413	9.5139210	4283	10.4860790	55
6	9.4923083	3863	9.9779593	413	9.5143490	4279	10.4856510	54
7	9.4926946	3860	9.9779180	414	9.5147766	4276	10.4852234	53
8	9.4930806	3855	9.9778766	414	9.5152039	4273	10.4847961	52
9	9.4934661	3852	9.9778353	415	9.5156309	4270	10.4843691	51
10	9.4938513	3848	9.9777938	415	9.5160575	4266	10.4839425	50
		3844		415		4263		
11	9.4942361	3841	9.9777522	415	9.5164838	4259	10.4835162	49
12	9.4946205	3837	9.9777108	416	9.5169097	4256	10.4830903	48
13	9.4950046	3833	9.9776693	416	9.5173353	4252	10.4826647	47
14	9.4953883	3829	9.9776277	417	9.5177606	4249	10.4822394	46
15	9.4957716	3827	9.9775860	416	9.5181855	4246	10.4818145	45
16	9.4961545	3825	9.9775444	418	9.5186101	4243	10.4813899	44
17	9.4965370	3822	9.9775026	417	9.5190344	4239	10.4809656	43
18	9.4969192	3818	9.9774609	418	9.5194582	4236	10.4805411	42
19	9.4973010	3814	9.9774191	419	9.5198819	4233	10.4801181	41
20	9.4976824	3811	9.9773772	418	9.5203052	4230	10.4796948	40
		3807		420		4226		
21	9.4980635	3803	9.9773354	419	9.5207282	4222	10.4792718	39
22	9.4984442	3800	9.9772934	420	9.5211508	4219	10.4788492	38
23	9.4988245	3795	9.9772515	421	9.5215720	4216	10.4784270	37
24	9.4992045	3793	9.9772095	421	9.5219950	4213	10.4780050	36
25	9.4995840	3788	9.9771674	422	9.5224166	4210	10.4775834	35
26	9.4999633	3785	9.9771253	422	9.5228379	4207	10.4771621	34
27	9.5003421	3781	9.9770832	422	9.5232589	4204	10.4767411	33
28	9.5007206	3777	9.9770410	422	9.5236795	4200	10.4763205	32
29	9.5010987		9.9769988	422	9.5240999		10.4759001	31
30	9.5014764		9.9769566		9.5245199		10.4754801	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. 18		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.
30	9.5014764		9.9769566		9.5245199		10.4754801
		3774		423		4196	
31	9.5018538		9.9769143	422	9.5249395	4194	10.4750605
32	9.5022308	3770	9.9768720	424	9.5253589	4190	10.4746411
33	9.5026075	3767	9.9768296	424	9.5257779	4187	10.4742221
34	9.5029838	3763	9.9767872	425	9.5261966	4184	10.4738034
35	9.5033597	3759	9.9767447	425	9.5266150	4181	10.4733850
36	9.5037353	3756	9.9767022	425	9.5270331	4177	10.4729669
37	9.5041105	3752	9.9766597	425	9.5274508	4174	10.4725492
38	9.5044853	3748	9.9766171	426	9.5278682	4171	10.4721318
39	9.5048598	3745	9.9765745	427	9.5282853	4168	10.4717147
40	9.5052339	3741	9.9765318		9.5287021		10.4712979
		3738		427		4165	
41	9.5056077		9.9764891	427	9.5291186	4161	10.4708814
42	9.5059811	3734	9.9764464	428	9.5295347	4158	10.4704653
43	9.5063542	3731	9.9764036	428	9.5299505	4156	10.4700495
44	9.5067268	3726	9.9763608	429	9.5303661	4152	10.4696339
45	9.5070992	3724	9.9763179	429	9.5307813	4152	10.4692187
46	9.5074712	3720	9.9762750	429	9.5311961	4148	10.4688039
47	9.5078428	3716	9.9762321	430	9.5316107	4146	10.4683893
48	9.5082141	3712	9.9761891	430	9.5320250	4142	10.4679750
49	9.5085850	3709	9.9761461	431	9.5324389	4139	10.4675611
50	9.5089556	3706	9.9761030	431	9.5328526	4137	10.4671474
		3702		431		4133	
51	9.5093258		9.9760599	432	9.5332659	4130	10.4667341
52	9.5096956	3698	9.9760167	432	9.5336789	4127	10.4663211
53	9.5100651	3695	9.9759736	433	9.5340916	4124	10.4659084
54	9.5104343	3692	9.9759303	433	9.5345040	4121	10.4654960
55	9.5108031	3688	9.9758870	433	9.5349161	4117	10.4650839
56	9.5111716	3685	9.9758437	433	9.5353278	4115	10.4646722
57	9.5115397	3681	9.9758004	434	9.5357393	4112	10.4642607
58	9.5119074	3677	9.9757570	435	9.5361505	4108	10.4638495
59	9.5122749	3675	9.9757135	434	9.5365613	4106	10.4634387
60	9.5126419	3670	9.9756701		9.5369719		10.4630281
	L. Cos.		L. Sin.		L. Cot.		L. Tan.
G. 71							
U 2							

Sinus			G. 19		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.5126419		9.9756701		9.5369719		10.4630281	60
		3667		436		4102		
1	9.5130086		9.9756265		9.5373821		10.4626179	59
2	9.5133750	3664	9.9755830	435	9.5377920	4099	10.4622080	58
3	9.5137410	3660	9.9755394	436	9.5382017	4097	10.4617983	57
4	9.5141067	3657	9.9754957	437	9.5386110	4093	10.4613890	56
5	9.5144721	3654	9.9754521	436	9.5390200	4090	10.4609800	55
6	9.5148371	3650	9.9754083	438	9.5394287	4087	10.4605713	54
7	9.5152017	3646	9.9753646	437	9.5398371	4084	10.4601629	53
8	9.5155660	3643	9.9753208	438	9.5402453	4082	10.4597547	52
9	9.5159300	3640	9.9752769	439	9.5406531	4078	10.4593469	51
10	9.5162926	4636	9.9752330	439	9.5410606	4075	10.4589394	50
		4633		439		4072		
11	9.5166569	4629	9.9751891	440	9.5414678	4069	10.4585322	49
12	9.5170198	4626	9.9751451	440	9.5418747	4066	10.4581252	48
13	9.5173824	4623	9.9751011	441	9.5422812	4064	10.4577187	47
14	9.5177447	4619	9.9750570	441	9.5426877	4060	10.4573122	46
15	9.5181066	4616	9.9750129	441	9.5430937	4057	10.4569062	45
16	9.5184682	4613	9.9749688	442	9.5434994	4054	10.4565006	44
17	9.5188295	4609	9.9749246	442	9.5439048	4052	10.4560952	43
18	9.5191904	4606	9.9748804	443	9.5443100	4048	10.4556900	42
19	9.5195510	4602	9.9748361	443	9.5447148	4045	10.4552852	41
20	9.5199112		9.9747918		9.5451193		10.4548807	40
		4599		443		4043		
21	9.5202711	4596	9.9747475	444	9.5455236	4040	10.4544764	39
22	9.5206307	4592	9.9747031	444	9.5459276	4036	10.4540724	38
23	9.5209899	4589	9.9746587	445	9.5463312	4034	10.4536688	37
24	9.5213488	4586	9.9746142	445	9.5467346	4031	10.4532654	36
25	9.5217074	4582	9.9745697	445	9.5471377	4028	10.4528622	35
26	9.5220656	4577	9.9745252	446	9.5475405	4025	10.4524595	34
27	9.5224235	4576	9.9744806	447	9.5479430	4022	10.4520570	33
28	9.5227811	4572	9.9744359	446	9.5483452	4019	10.4516548	32
29	9.5231383	4570	9.9743912	447	9.5487471	4016	10.4512529	31
30	9.5234953		9.9743466		9.5491487		10.4508513	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G.70

Sinus

G. 19

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.5234953	3565	9.9743466	448	9.5491487	4013	10.4508513	30
31	9.5238518	3562	9.9743018	448	9.5495500	4011	10.4504500	29
32	9.5242081	3558	9.9742570	448	9.5499511	4008	10.4500489	28
33	9.5245640	3556	9.9742122	449	9.5503519	4004	10.4496481	27
34	9.5249196	3553	9.9741673	449	9.5507523	4002	10.4492477	26
35	9.5252749	3549	9.9741224	450	9.5511525	3999	10.4488475	25
36	9.5256298	3546	9.9740774	450	9.5515524	3997	10.4484476	24
37	9.5259844	3543	9.9740324	451	9.5519521	3993	10.4480479	23
38	9.5263387	3540	9.9739873	451	9.5523514	3990	10.4476486	22
39	9.5266927	3536	9.9739422	451	9.5527504	3988	10.4472496	21
40	9.5270463	3534	9.9738972	452	9.5531492	3985	10.4468508	20
41	9.5273997	3529	9.9738519	452	9.5535477	3982	10.4464522	19
42	9.5277526	3527	9.9738067	452	9.5539459	3979	10.4460541	18
43	9.5281052	3524	9.9737615	453	9.5543438	3977	10.4456562	17
44	9.5284577	3520	9.9737162	453	9.5547415	3973	10.4452585	16
45	9.5288097	3517	9.9736709	454	9.5551388	3971	10.4448612	15
46	9.5291614	3514	9.9736255	454	9.5555359	3968	10.4444641	14
47	9.5295128	3510	9.9735801	455	9.5559327	3965	10.4440672	13
48	9.5298638	3508	9.9735346	455	9.5563292	3963	10.4436708	12
49	9.5302146	3504	9.9734891	456	9.5567255	3959	10.4432745	11
50	9.5305650	3501	9.9734435	455	9.5571214	3957	10.4428786	10
51	9.5309151	3498	9.9733980	457	9.5575171	3954	10.4424829	9
52	9.5312649	3494	9.9733523	456	9.5579125	3952	10.4420875	8
53	9.5316143	3492	9.9733067	457	9.5583077	3948	10.4416923	7
54	9.5319635	3488	9.9732610	458	9.5587025	3947	10.4412975	6
55	9.5323123	3485	9.9732152	458	9.5590971	3943	10.4409029	5
56	9.5326608	3482	9.9731694	458	9.5594914	3940	10.4405086	4
57	9.5330090	3479	9.9731236	459	9.5598854	3938	10.4401146	3
58	9.5333569	3475	9.9730777	459	9.5602792	3935	10.4397208	2
59	9.5337044	3473	9.9730318	460	9.5606727	3932	10.4393273	1
60	9.5340517		9.9729858		9.5610659		10.4389341	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 70.

SINUS			G. 20.		TANGENTES			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. 20.	L. Cot.	
0	9.5340517		9.9729858		9.5610658		10.4389341	60
		3469		460		3929		
1	9.5343986	3466	9.9729398	460	9.5614588	3927	10.4385412	59
2	9.5347452	3463	9.9728938	461	9.5618515	3924	10.4381485	58
3	9.5350915	3460	9.9728477	461	9.5622439	3921	10.4377561	57
4	9.5354375	3457	9.9728016	462	9.5626360	3918	10.4373640	56
5	9.5357822	3454	9.9727554	462	9.5630278	3916	10.4369722	55
6	9.5361286	3451	9.9727092	463	9.5634194	3913	10.4365806	54
7	9.5364737	3447	9.9726629	463	9.5638107	3911	10.4361893	53
8	9.5368184	3444	9.9726166	463	9.5642018	3907	10.4357982	52
9	9.5371628	3441	9.9725703	464	9.5645925	3906	10.4354075	51
10	9.5375069		9.9725239	464	9.5649831		10.4350169	50
		3439		464		3902		
11	9.5378508	3435	9.9724775	465	9.5653723	3900	10.4346267	49
12	9.5381942	3432	9.9724310	465	9.5657633	3897	10.4342367	48
13	9.5385375	3429	9.9723845	465	9.5661530	3894	10.4338470	47
14	9.5388804	3426	9.9723380	466	9.5665424	3892	10.4334576	46
15	9.5392230	3423	9.9722914	466	9.5669316	3889	10.4330684	45
16	9.5395653	3420	9.9722448	467	9.5673205	3886	10.4326795	44
17	9.5399073	3416	9.9721981	467	9.5677091	3884	10.4322909	43
18	9.5402489	3414	9.9721514	467	9.5680975	3881	10.4319025	42
19	9.5405903	3411	9.9721047	468	9.5684856	3879	10.4315144	41
20	9.5409314		9.9720579		9.5688735		10.4311265	40
		3407		469		3876		
21	9.5412721	3405	9.9720110	468	9.5692611	3872	10.4307389	39
22	9.5416126	3401	9.9719642	470	9.5696484	3871	10.4303516	38
23	9.5419527	3399	9.9719172	467	9.5700355	3868	10.4299645	37
24	9.5422926	3395	9.9718703	470	9.5704222	3865	10.4295777	36
25	9.5426321	3392	9.9718233	471	9.5708088	3863	10.4291912	35
26	9.5429713	3390	9.9717762	471	9.5711951	3860	10.4288049	34
27	9.5433103	3386	9.9717291	471	9.5715811	3858	10.4284189	33
28	9.5436489	3384	9.9716820	472	9.5719669	3855	10.4280331	32
29	9.5439873	3380	9.9716348	472	9.5723524	3853	10.4276476	31
30	9.5443253		9.9715876		9.5727377		10.4272623	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G.69.

Sinus		G. 20.		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	Sec.	L. Cot.
30	9.5443253		9.9715876		9.5727377		10.4272623
		3377		472		3850	
31	9.5446630		9.9715404		9.5731227		10.4268773
32	9.5450005	3375	9.9714931	473	9.5735074	3847	10.4264926
33	9.5453376	3371	9.9714457	474	9.5738919	3843	10.4261081
34	9.5456745	3369	9.9713984	473	9.5742761	3841	10.4257239
35	9.5460110	3365	9.9713509	475	9.5746601	3840	10.4253399
36	9.5463472	3362	9.9713035	474	9.5750438	3837	10.4249562
37	9.5466832	3360	9.9712560	475	9.5754272	3834	10.4245728
38	9.5470189	3357	9.9712084	476	9.5758104	3832	10.4241896
39	9.5473542	3353	9.9711608	476	9.5761934	3830	10.4238066
40	9.5476893	3351	9.9711132	476	9.5765761	3827	10.4234239
		3347		477		3824	
41	9.5480240		9.9710655		9.5769585		10.4230415
42	9.5483585	3345	9.9710178	477	9.5773407	3822	10.4226593
43	9.5486927	3342	9.9709701	477	9.5777226	3819	10.4222774
44	9.5490266	3339	9.9709223	478	9.5781043	3817	10.4218957
45	9.5493602	3334	9.9708744	479	9.5784858	3815	10.4215142
46	9.5496935	3333	9.9708265	479	9.5788669	3811	10.4211331
47	9.5500265	3330	9.9707786	479	9.5792479	3810	10.4207521
48	9.5503592	3327	9.9707306	480	9.5796286	3807	10.4203714
49	9.5506916	3324	9.9706826	480	9.5800090	3804	10.4199910
50	9.5510237	3321	9.9706346	480	9.5803892	3802	10.4196108
		3319		481		3801	
51	9.5513556		9.9705865		9.5807691		10.4192309
52	9.5516871	3315	9.9705383	482	9.5811488	3797	10.4188512
53	9.5520184	3313	9.9704902	481	9.5815282	3794	10.4184718
54	9.5523494	3310	9.9704419	483	9.5819074	3792	10.4180926
55	9.5526801	3307	9.9703937	482	9.5822864	3790	10.4177136
56	9.5530105	3304	9.9703454	483	9.5826651	3787	10.4173349
57	9.5533406	3301	9.9702970	484	9.5830435	3784	10.4169565
58	9.5536704	3298	9.9702486	484	9.5834217	3782	10.4165783
59	9.5539999	3295	9.9702002	484	9.5837997	3780	10.4162003
60	9.5543292	3293	9.9701517	475	9.5841774	3777	10.4158226
	L. Cos.		L. Sin.		L. Cot.		L. Tan.
							M

Sinus

G. 21.

Tangentēs

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.5543292		9.9701517		9.5841774		10.4158226	60
		3289		485		3775		
1	9.5546581	3287	9.9701032	485	9.5845549	3772	10.4154451	59
2	9.5549868	3284	9.9700547	486	9.5849321	3770	10.4150679	58
3	9.5553152	3281	9.9700061	487	9.5853091	3768	10.4146909	57
4	9.5556433	3278	9.9699574	487	9.5856859	3765	10.4143141	56
5	9.5559711	3276	9.9699087	487	9.5860624	3762	10.4139376	55
6	9.5562987	3272	9.9698600	488	9.5864386	3761	10.4135614	54
7	9.5566259	3272	9.9698112	488	9.5868147	3761	10.4131853	53
8	9.5569529	3269	9.9697624	488	9.5871904	3757	10.4128096	52
9	9.5572796	3267	9.9697136	489	9.5875660	3756	10.4124340	51
10	9.5576060	3264	9.9696647	489	9.5879413	3753	10.4120587	50
		3261		489		3750		
11	9.5579221	3258	9.9696158	490	9.5883163	3749	10.4116837	49
12	9.5582479	3256	9.9695668	491	9.5886912	3745	10.4113088	48
13	9.5585735	3253	9.9695177	490	9.5890657	3744	10.4109343	47
14	9.5589088	3250	9.9694687	491	9.5894401	3741	10.4105599	46
15	9.5592328	3247	9.9694196	492	9.5898142	3739	10.4101858	45
16	9.5595585	3244	9.9693704	492	9.5901881	3736	10.4098119	44
17	9.5598829	3242	9.9693212	492	9.5905617	3734	10.4094382	43
18	9.5602071	3239	9.9692720	493	9.5909351	3731	10.4090648	42
19	9.5605310	3236	9.9692227	493	9.5913082	3730	10.4086919	41
20	9.5608546	3233	9.9691734	494	9.5916812	3727	10.4083188	40
		3233		494		3727		
21	9.5611779	3231	9.9691240	494	9.5920539	3724	10.4079461	39
22	9.5615010	3227	9.9690746	494	9.5924262	3722	10.4075737	38
23	9.5618237	3225	9.9690252	495	9.5927985	3720	10.4072015	37
24	9.5621462	3223	9.9689757	495	9.5931705	3718	10.4068295	36
25	9.5624685	3219	9.9689262	496	9.5935422	3715	10.4064577	35
26	9.5627904	3217	9.9688766	496	9.5939138	3713	10.4060862	34
27	9.5631121	3214	9.9688270	497	9.5942851	3710	10.4057149	33
28	9.5634335	3211	9.9687773	497	9.5946561	3708	10.4053439	32
29	9.5637546	3208	9.9687276	497	9.5950269	3706	10.4049731	31
30	9.5640754		9.9686779		9.5953975		10.4046025	30
	L. Sin.		L. Cos.		L. Tan.		L. Cot.	M

G. 68.

Sinus			G. 21		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
30	9.5640754		9.9686779		9.5953975		10.4046025
		3206		498		3704	
31	9.5643960		9.9686181		9.5957679		10.4042321
32	9.5647163	3203	9.9685583	498	9.5961380	3701	10.4038620
33	9.5650363	3200	9.9684984	499	9.5965079	3699	10.4034921
34	9.5653561	3198	9.9684385	499	9.5968776	3697	10.4031224
35	9.5656756	3195	9.9683786	499	9.5972470	3694	10.4027530
36	9.5659948	3192	9.9683186	500	9.5976162	3692	10.4023838
37	9.5663137	3189	9.9682585	501	9.5979852	3690	10.4020148
38	9.5666324	3187	9.9681984	501	9.5983540	3688	10.4016460
39	9.5669508	3184	9.9681383	501	9.5987225	3685	10.4012775
40	9.5672689	3181	9.9681781	502	9.5990908	3683	10.4009092
		3179		502		3681	
41	9.5675868		9.9681179		9.5994588		10.4005411
42	9.5679044	3176	9.9680577	502	9.5998267	3678	10.4001732
43	9.5682217	3173	9.9680274	502	9.6001943	3676	10.3998057
44	9.5685387	3170	9.9679771	503	9.6005617	3674	10.3994383
45	9.5688555	3168	9.9679267	504	9.6009289	3672	10.3990711
46	9.5691721	3165	9.9678762	504	9.6012958	3669	10.3987042
47	9.5694883	3162	9.9678258	505	9.6016625	3667	10.3983375
48	9.5698042	3160	9.9677753	505	9.6020290	3665	10.3979710
49	9.5701200	3157	9.9677247	506	9.6023953	3663	10.3976047
50	9.5704355	3155	9.9676741	506	9.6027613	3660	10.3972387
		3151		506		3658	
51	9.5707506	3150	9.9676235		9.6031271		10.3968729
52	9.5710656	3146	9.9675728	507	9.6034927	3656	10.3965073
53	9.5713802	3144	9.9675221	507	9.6038581	3654	10.3961419
54	9.5716946	3141	9.9674713	508	9.6042233	3652	10.3957767
55	9.5720087	3139	9.9674205	508	9.6045882	3649	10.3954118
56	9.5723226	3136	9.9673697	508	9.6049529	3647	10.3950471
57	9.5726362	3133	9.9673188	508	9.6053174	3645	10.3946826
58	9.5729495	3131	9.9672679	509	9.6056817	3643	10.3943182
59	9.5732626	3128	9.9672169	510	9.6060457	3640	10.3939543
60	9.5735754		9.9671659	510	9.6064096	3639	10.3935904
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 68.

G. 68.

X

Sinus			G. 22.		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. Co.	L. Cor.
0	9.5735754		9.9671659		9.6064096		10.3935904
		3126		511		3636	
1	9.5738880		9.9671148		9.6067732		10.3932268
2	9.5742003	3122	9.9670637	511	9.6071366	3634	10.3928634
3	9.5745123	3120	9.9670125	512	9.6074997	3631	10.3925003
4	9.5748240	3117	9.9669614	511	9.6078627	3620	10.3921373
5	9.5751356	3116	9.9669101	513	9.6082254	3627	10.3917746
6	9.5754468	3112	9.9668588	513	9.6085880	3626	10.3914120
7	9.5757578	3110	9.9668072	512	9.6089503	3623	10.3910497
8	9.5760685	3107	9.9667562	513	9.6093124	3621	10.3906876
9	9.5763790	3105	9.9667048	514	9.6096742	3618	10.3903258
10	9.5766892	3102	9.9666533	515	9.6100359	3617	10.3899641
		3099		515		3614	
11	9.5769991	3097	9.9666018		9.6103973		10.3896027
12	9.5773088	3095	9.9665503	515	9.6107586	3613	10.3892414
13	9.5776183	3092	9.9664987	516	9.6111196	3610	10.3888802
14	9.5779275	3091	9.9664471	516	9.6114804	3608	10.3885196
15	9.5782364	3086	9.9663954	517	9.6118409	3605	10.3881591
16	9.5785450	3085	9.9663437	517	9.6122013	3604	10.3877987
17	9.5788535	3081	9.9662920	517	9.6125615	3602	10.3874385
18	9.5791616	3079	9.9662402	518	9.6129214	3599	10.3870786
19	9.5794695	3077	9.9661884	518	9.6132812	3598	10.3867188
20	9.5797772		9.9661365	519	9.6136407	3595	10.3863592
		3073		519		3593	
21	9.5800845	3072	9.9660846		9.6140000		10.3860000
22	9.5803917	3069	9.9660326	520	9.6143591	3591	10.3856409
23	9.5806986	3066	9.9659806	520	9.6147180	3589	10.3852820
24	9.5810052	3064	9.9659285	521	9.6150766	3586	10.3849234
25	9.5813116	3061	9.9658764	521	9.6154351	3585	10.3845649
26	9.5816177	3059	9.9658243	521	9.6157934	3583	10.3842066
27	9.5819236	3056	9.9657721	522	9.6161514	3580	10.3838486
28	9.5822292	3053	9.9657199	522	9.6165093	3579	10.3834907
29	9.5825345	3052	9.9656677	522	9.6168669	3576	10.3831321
30	9.5828397		9.9656153	524	9.6172243	3574	10.3827757
	L. Cos.		L. Sin.		L. Cor.		L. Tan.

G 67.

G 67.

SINUS

G. 22.

Tangentes

M	L.Sin.	Diff.	L.Cof.	D.	L.Tan.	D.co.	L.Cot.	
30	9.5828297		9.9656152		9.6172243		10.3827757	30
		3048		523		3572		
31	9.5821245		9.9655630		9.6175815		10.3824185	29
32	9.5823291	3046	9.9655106	524	9.6179385	3570	10.3820615	28
33	9.5837525	3044	9.9654582	524	9.6182953	3568	10.3817047	27
34	9.5840575	3041	9.9654057	525	9.6186519	3566	10.3813481	26
35	9.5842615	3039	9.9653522	525	9.6190083	3564	10.3809917	25
36	9.5846651	3036	9.9653006	525	9.6193645	3562	10.3806355	24
37	9.5849685	3034	9.9652480	526	9.6197205	3560	10.3802795	23
38	9.5852716	3031	9.9651952	528	9.6200762	3557	10.3799228	22
39	9.5855745	3029	9.9651426	526	9.6204318	3556	10.3795682	21
40	9.5858771	3026	9.9650899	527	9.6207872	3554	10.3792128	20
		3024		528		3551		
41	9.5861795	3021	9.9650371	528	9.6211423	3550	10.3788577	19
42	9.5864816	3019	9.9649843	529	9.6214973	3547	10.3785027	18
43	9.5867835	3016	9.9649314	529	9.6218520	3546	10.3781480	17
44	9.5870851	3014	9.9648785	529	9.6222066	3543	10.3777934	16
45	9.5873865	3011	9.9648256	530	9.6225609	3541	10.3774391	15
46	9.5876875	3009	9.9647726	531	9.6229150	3540	10.3770850	14
47	9.5879885	3007	9.9647195	530	9.6232690	3537	10.3767310	13
48	9.5882892	3004	9.9646665	532	9.6236217	3536	10.3763773	12
49	9.5885896	3001	9.9646132	531	9.6239763	3533	10.3760237	11
50	9.5888897	3000	9.9645602	533	9.6243296	3531	10.3756704	10
51	9.5891897	2996	9.9645069	532	9.6246827	3529	10.3753173	9
52	9.5894892	2995	9.9644527	533	9.6250356	3528	10.3749624	8
53	9.5897888	2992	9.9644000	534	9.6253884	3525	10.3746071	7
54	9.5900880	2989	9.9643470	533	9.6257409	3523	10.3742521	6
55	9.5903869	2987	9.9642927	535	9.6260932	3522	10.3738968	5
56	9.5906856	2985	9.9642402	534	9.6264454	3519	10.3735416	4
57	9.5909841	2982	9.9641868	536	9.6267973	3518	10.3731867	3
58	9.5912823	2980	9.9641332	535	9.6271491	3515	10.3728319	2
59	9.5915803	2977	9.9640797	536	9.6275006	3513	10.3724794	1
60	9.5918780		9.9640261		9.6278519		10.3721281	0
	L.Cof.		L.Sin.		L.Cot.		L.Tan.	M

G. 67.

X 2

Sinus			G 23		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	Dec.	L. Cot.	
0	9.5918780		9.9640261		9.6278519		10.3721481	60
		2975		537		3512		
1	9.5921755	2973	9.9639724	537	9.6282031	3509	10.3717969	59
2	9.5924728	2970	9.9639187	537	9.6285540	3508	10.3714460	58
3	9.5927698	2968	9.9638650	537	9.6289048	3508	10.3710952	57
4	9.5930666	2966	9.9638112	538	9.6292552	3505	10.3707447	56
5	9.5933631	2965	9.9637574	538	9.6296057	3504	10.3703943	55
6	9.5936594	2963	9.9637036	538	9.6299558	3501	10.3700442	54
7	9.5939555	2961	9.9636496	540	9.6303058	3500	10.3696942	53
8	9.5942513	2958	9.9635957	539	9.6306556	3498	10.3693444	52
9	9.5945469	2956	9.9635417	540	9.6310052	3496	10.3689948	51
10	9.5948422	2953	9.9634877	540	9.6313545	3493	10.3686455	50
		2951		541		3492		
11	9.5951373	2949	9.9634336	541	9.6317037	3490	10.3682963	49
12	9.5954322	2946	9.9633795	541	9.6320527	3488	10.3679473	48
13	9.5957268	2944	9.9633253	542	9.6324015	3486	10.3675985	47
14	9.5960212	2942	9.9632711	542	9.6327501	3486	10.3672497	46
15	9.5963154	2940	9.9632168	542	9.6330985	3484	10.3669015	45
16	9.5966092	2937	9.9631625	542	9.6334468	3483	10.3665532	44
17	9.5969030	2937	9.9631082	543	9.6337948	3480	10.3662051	43
18	9.5971965	2935	9.9630538	544	9.6341426	3478	10.3658574	42
19	9.5974897	2932	9.9630094	544	9.6344902	3477	10.3655097	41
20	9.5977827	2930	9.9629649	545	9.6348378	3475	10.3651622	40
		2927		545		3472		
21	9.5980751	2925	9.9628904	546	9.6351850	3471	10.3648150	39
22	9.5983679	2923	9.9628358	546	9.6355321	3469	10.3644679	38
23	9.5986602	2921	9.9627812	546	9.6358790	3467	10.3641210	37
24	9.5989523	2918	9.9627266	547	9.6362257	3467	10.3637742	36
25	9.5992441	2916	9.9626719	547	9.6365722	3465	10.3634278	35
26	9.5995357	2914	9.9626172	548	9.6369185	3463	10.3630815	34
27	9.5998271	2910	9.9625624	548	9.6372646	3461	10.3627354	33
28	9.6001181	2909	9.9625076	549	9.6376106	3460	10.3623894	32
29	9.6004090	2907	9.9624527	549	9.6379568	3457	10.3620437	31
30	9.6006997		9.9623978		9.6383019	3456	10.3616981	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 66.

G. 66.

Sinus			G. 23		Tangentēs			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.6006997		9.9613978		9.6383019		10.3616981	30
—	—	2904	—	550	—	3454	—	—
31	9.6009901		9.9613428		9.6386473		10.3613527	29
32	9.6012803	2902	9.9612878	550	9.6389925	3452	10.3610075	28
33	9.6015703	2900	9.9612428	550	9.6393375	3450	10.3606625	27
34	9.6018600	2897	9.9611977	551	9.6396823	3448	10.3603177	26
35	9.6021495	2895	9.9611526	551	9.6400269	3446	10.3599731	25
36	9.6024388	2893	9.9611074	552	9.6403714	3445	10.3596286	24
37	9.6027278	2890	9.9610622	552	9.6407156	3442	10.3592844	23
38	9.6030166	2888	9.9610169	553	9.6410597	3441	10.3589403	22
39	9.6033052	2886	9.9619016	553	9.6414036	3439	10.3585964	21
40	9.6035936	2884	9.9618463	553	9.6417473	3437	10.3582527	20
—	—	2881	—	554	—	3435	—	—
41	9.6038817	2879	9.9617909	554	9.6420908	3434	10.3579092	19
42	9.6041696	2877	9.9617355	555	9.6424342	3431	10.3575658	18
43	9.6044573	2875	9.9616800	555	9.6427773	3430	10.3572227	17
44	9.6047448	2872	9.9616245	556	9.6431203	3428	10.3568797	16
45	9.6050320	2870	9.9615689	556	9.6434631	3426	10.3565369	15
46	9.6053190	2867	9.9615133	557	9.6438057	3424	10.3561943	14
47	9.6056057	2866	9.9614576	556	9.6441481	3422	10.3558519	13
48	9.6058922	2863	9.9614020	557	9.6444903	3421	10.3555097	12
49	9.6061786	2861	9.9613463	559	9.6448324	3419	10.3551676	11
50	9.6064647	2859	9.9612904	558	9.6451743	3417	10.3548257	10
—	—	2856	—	559	—	3415	—	—
51	9.6067506	2853	9.9612346	559	9.6455160	3413	10.3544840	9
52	9.6070362	2851	9.9611787	559	9.6458575	3412	10.3541425	8
53	9.6073216	2850	9.9611228	560	9.6461988	3410	10.3538012	7
54	9.6076068	2850	9.9610668	560	9.6465400	3410	10.3534600	6
55	9.6078918	2847	9.9610108	560	9.6468810	3407	10.3531190	5
56	9.6081765	2846	9.9609548	561	9.6472217	3407	10.3527783	4
57	9.6084611	2843	9.9608987	561	9.6475624	3404	10.3524376	3
58	9.6087454	2840	9.9608426	562	9.6479028	3403	10.3520972	2
59	9.6090294	2839	9.9607864	562	9.6482431	3400	10.3517569	1
60	9.6093133	2837	9.9607302	562	9.6485831	3400	10.3514169	0
—	—	2835	—	563	—	3400	—	—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 66

G. 66

Sine			G. 24.			Tangents		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.6093133		9.9607302		9.6485831		10.3514169	60
		2836		563		3399		
1	9.6095959		9.9606739		9.6489230		10.3510770	59
2	9.6098803	2834	9.9606176	563	9.6492628	3398	10.3507372	58
3	9.6101635	2832	9.9605612	564	9.6496023	3395	10.3503977	57
4	9.6104465	2830	9.9605048	564	9.6499417	3394	10.3500583	56
5	9.6107292	2828	9.9604484	564	9.6502809	3392	10.3497191	55
6	9.6110118	2825	9.9603919	565	9.6506199	3390	10.3493801	54
7	9.6112941	2823	9.9603354	565	9.6509587	3388	10.3490413	53
8	9.6115762	2821	9.9602788	566	9.6512974	3387	10.3487026	52
9	9.6118580	2818	9.9602222	566	9.6516359	3385	10.3483641	51
10	9.6121397	2817	9.9601655	567	9.6519742	3383	10.3480258	50
		2814		567		3381		
11	9.6124211	2812	9.9601088		9.6523123	3380	10.3476877	49
12	9.6127023	2810	9.9600520	568	9.6526503	3378	10.3473497	48
13	9.6129833	2808	9.9599952	568	9.6529881	3376	10.3470119	47
14	9.6132641	2805	9.9599384	568	9.6533257	3374	10.3466743	46
15	9.6135446	2804	9.9598815	569	9.6536631	3373	10.3463369	45
16	9.6138250	2801	9.9598246	569	9.6540004	3371	10.3459996	44
17	9.6141051	2799	9.9597676	570	9.6543375	3369	10.3456625	43
18	9.6143850	2797	9.9597106	571	9.6546744	3368	10.3453256	42
19	9.6146647	2794	9.9596535	571	9.6550112	3365	10.3449888	41
20	9.6149441		9.9595964	571	9.6553477		10.3446523	40
		2793		572		3364		
21	9.6152234	2790	9.9595393		9.6556841		10.3443159	39
22	9.6155024	2788	9.9594821	573	9.6560204	3363	10.3439796	38
23	9.6157812	2786	9.9594248	573	9.6563564	3360	10.3436436	37
24	9.6160598	2784	9.9593675	573	9.6566923	3359	10.3433077	36
25	9.6163382	2782	9.9593102	573	9.6570280	3357	10.3429720	35
26	9.6166164	2780	9.9592528	574	9.6573636	3356	10.3426364	34
27	9.6168944	2777	9.9591954	574	9.6576989	3353	10.3423011	33
28	9.6171721	2775	9.9591380	575	9.6580341	3352	10.3419659	32
29	9.6174496	2774	9.9590805	576	9.6583692	3351	10.3416308	31
30	9.6177270		9.9590229	576	9.6587041	3348	10.3412960	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. 24.		Tangentes			
M	L. Sin.	Diff.	L. Cof.	D.	L. Tan.	D. co.	L. Cot.	
30	9.6177270		9.9590229		9.6587041		10.3412960	30
		2771		576		3347		
31	9.6180041		9.9589653		9.6590387		10.3409612	29
		2768		576		3346		
32	9.6181809		9.9589077		9.6593732		10.3406267	28
		2767		577		3343		
33	9.6183576		9.9588500		9.6597076		10.3402924	27
		2765		577		3342		
34	9.6188241		9.9587923		9.6600418		10.3399582	26
		2762		578		3340		
35	9.6191102		9.9587345		9.6603758		10.3396242	25
		2761		578		3339		
36	9.6193864		9.9586767		9.6607097		10.3392902	24
		2758		579		3337		
37	9.6196622		9.9586188		9.6610434		10.3389566	23
		2756		579		3335		
38	9.6199378		9.9585609		9.6613769		10.3386221	22
		2754		579		3334		
39	9.6202132		9.9585030		9.6617103		10.3382897	21
		2752		580		3331		
40	9.6204884		9.9584450		9.6620434		10.3379566	20
		2750		581		3330		
41	9.6207634		9.9583869		9.6623765		10.3376236	19
		2748		581		3329		
42	9.6210382		9.9583288		9.6627092		10.3372907	18
		2745		581		3327		
43	9.6213127		9.9582707		9.6630420		10.3369580	17
		2744		582		3325		
44	9.6215871		9.9582125		9.6633745		10.3366255	16
		2741		582		3324		
45	9.6218612		9.9581543		9.6637069		10.3362931	15
		2739		582		3322		
46	9.6221351		9.9580961		9.6640391		10.3359609	14
		2737		582		3320		
47	9.6224088		9.9580378		9.6643711		10.3356289	13
		2736		584		3319		
48	9.6226824		9.9579794		9.6647030		10.3352970	12
		2733		584		3316		
49	9.6229557		9.9579210		9.6650346		10.3349654	11
		2730		584		3316		
50	9.6232287		9.9578626		9.6653662		10.3346338	10
		2729		585		3313		
51	9.6235016		9.9578041		9.6656975		10.3343025	9
		2727		585		3313		
52	9.6237743		9.9577456		9.6660288		10.3339712	8
		2724		586		3310		
53	9.6240467		9.9576870		9.6663598		10.3336402	7
		2723		586		3309		
54	9.6243190		9.9576284		9.6666907		10.3333092	6
		2721		587		3307		
55	9.6245911		9.9575697		9.6670214		10.3329786	5
		2718		587		3305		
56	9.6248629		9.9575110		9.6673519		10.3326481	4
		2717		588		3304		
57	9.6251346		9.9574522		9.6676823		10.3323177	3
		2716		588		3303		
58	9.6254060		9.9573934		9.6680126		10.3319874	2
		2712		588		3300		
59	9.6256772		9.9573346		9.6683426		10.3316574	1
		2711		589		3299		
60	9.6259483		9.9572757		9.6686725		10.3313275	0
	L. Cof.		L. Sin.		L. Cot.		L. Tan.	M

G. 65.

Sinus			G. 25		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
0	9.6259483		9.9572757		9.6686725		10.3313275
		2708		589		3298	
1	9.6262191	2706	9.9572168		9.6690023	3296	10.3309977
2	9.6264897	2704	9.9571578	590	9.6693319	3294	10.3306681
3	9.6267601	2702	9.9570988	590	9.6696613	3292	10.3303387
4	9.6270303	2700	9.9570397	591	9.6699906	3291	10.3300094
5	9.6273003	2698	9.9569806	591	9.6703197	3289	10.3296802
6	9.6275701	2696	9.9569215	591	9.6706486	3288	10.3293514
7	9.6278397	2693	9.9568623	592	9.6709774	3286	10.3290226
8	9.6281090	2692	9.9568030	592	9.6713060	3285	10.3286940
9	9.6283782	2690	9.9567437	592	9.6716345	3283	10.3283655
10	9.6286472	2688	9.9566844	592	9.6719628	3282	10.3280372
				594		3282	
11	9.6289160	2685	9.9566250	594	9.6722910	3280	10.3277090
12	9.6291845	2684	9.9565656	594	9.6726190	3278	10.3273810
13	9.6294529	2682	9.9565061	595	9.6729468	3277	10.3270522
14	9.6297211	2679	9.9564466	595	9.6732745	3275	10.3267235
15	9.6299890	2678	9.9563870	596	9.6736020	3274	10.3263980
16	9.6302568	2675	9.9563274	596	9.6739294	3272	10.326076
17	9.6305242	2674	9.9562678	596	9.6742566	3270	10.3257424
18	9.6307917	2672	9.9562081	597	9.6745836	3269	10.3254164
19	9.6310589	2669	9.9561483	597	9.6749105	3267	10.3250895
20	9.6313258	2668	9.9560886	597	9.6752372	3266	10.3247628
				599		3266	
21	9.6315926	2665	9.9560287	598	9.6755638	3265	10.3244262
22	9.6318591	2664	9.9559689	600	9.6758902	3262	10.3240997
23	9.6321255	2661	9.9559089	599	9.6762165	3261	10.3237735
24	9.6323916	2660	9.9558490	600	9.6765426	3260	10.3234474
25	9.6326576	2657	9.9557890	601	9.6768686	3258	10.3231214
26	9.6329232	2656	9.9557289	601	9.6771944	3257	10.3228056
27	9.6331889	2653	9.9556688	601	9.6775201	3255	10.3224799
28	9.6334542	2652	9.9556087	602	9.6778456	3253	10.3221544
29	9.6337194	2650	9.9555485	602	9.6781709	3252	10.3218291
30	9.6339844		9.9554882	603	9.6784961		10.3215039
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 64

Sinus			G. 25		Tangentes			
M	L.Sin.	Diff.	L. Cof.	D.	L. Tan.	D.co.	L. Cof.	
30	9.6339844		9.9554881		9.6784961		10.3215039	30
		1647		601		3250		
31	9.6342491		9.9554280		9.6785111		10.3211789	29
32	9.6345137	1646	9.9553676	604	9.6791460	3249	10.3208540	28
33	9.6347780	1643	9.9553073	603	9.6794708	3248	10.3205291	27
34	9.6350422	1641	9.9552469	604	9.6797953	3245	10.3202047	26
35	9.6353062	1640	9.9551864	605	9.6801198	3244	10.3198803	25
36	9.6355699	1637	9.9551259	605	9.6804440	3243	10.3195560	24
37	9.6358335	1636	9.9550652	606	9.6807682	3242	10.3192318	23
38	9.6360969	1634	9.9550047	606	9.6810921	3239	10.3189079	22
39	9.6363601	1632	9.9549441	606	9.6814160	3239	10.3185840	21
40	9.6366231	1630	9.9548834	607	9.6817396	3236	10.3182604	20
		1628		607		3236		
41	9.6368859	1625	9.9548227	608	9.6820632	3233	10.3179368	19
42	9.6371484	1624	9.9547619	608	9.6823865	3233	10.3176135	18
43	9.6374108	1623	9.9547011	609	9.6827098	3230	10.3172902	17
44	9.6376731	1620	9.9546402	609	9.6830328	3229	10.3169672	16
45	9.6379351	1618	9.9545792	609	9.6833557	3228	10.3166442	15
46	9.6381969	1616	9.9545184	610	9.6836785	3226	10.3163215	14
47	9.6384585	1614	9.9544574	611	9.6840011	3225	10.3159989	13
48	9.6387199	1613	9.9543963	611	9.6843236	3223	10.3156764	12
49	9.6389812	1610	9.9543352	611	9.6846459	3222	10.3153541	11
50	9.6392422		9.9542741		9.6849681		10.3150319	10
		1608		612		3220		
51	9.6395030	1607	9.9542129	612	9.6852901	3219	10.3147099	9
52	9.6397637	1604	9.9541517	613	9.6856120	3218	10.3143880	8
53	9.6400241	1603	9.9540904	613	9.6859338	3215	10.3140662	7
54	9.6402844	1601	9.9540291	614	9.6862552	3215	10.3137447	6
55	9.6405445	1599	9.9539677	614	9.6865768	3213	10.3134232	5
56	9.6408044	1596	9.9539063	615	9.6868981	3211	10.3131019	4
57	9.6410640	1595	9.9538448	615	9.6872192	3210	10.3127808	3
58	9.6413235	1593	9.9537833	615	9.6875402	3209	10.3124598	2
59	9.6415828	1592	9.9537218	616	9.6878611	3207	10.3121389	1
60	9.6418426		9.9536602		9.6881818		10.3118182	0
	L.Cof.		L.Sin.		L. Cof.		L. Tan.	M

G. 64

G. 64

Y

SINUS

G. 26

Tangentes

N ^o	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.6418420		9.9536602		9.881818		10.3118182	60
		2589		617		3205		
1	9.6421009	2587	9.9534751	616	9.6885023		10.3114977	59
2	9.6423596	2586	9.9532899	618	9.6888227	3204	10.3111773	58
3	9.6426182	2585	9.9531048	617	9.6891430	3203	10.3108570	57
4	9.6428765	2584	9.9529197	616	9.6894631	3201	10.3105369	56
5	9.6431347	2582	9.9527346	618	9.6897831	3200	10.3102169	55
6	9.6433926	2577	9.9525495	619	9.6901030	3199	10.3098970	54
7	9.6436504	2578	9.9523644	619	9.6904226	3196	10.3095774	53
8	9.6439080	2576	9.9521793	620	9.6907422	3196	10.3092578	52
9	9.6441654	2574	9.9519942	620	9.6910616	3194	10.3089384	51
10	9.6444226	2572	9.9518091	620	9.6913809	3193	10.3086191	50
		2570		621		3191		
11	9.6446796	2569	9.9516240	622	9.6917000	3189	10.3082900	49
12	9.6449365	2566	9.9514389	622	9.6920189	3189	10.3079811	48
13	9.6451931	2565	9.9512538	622	9.6923378	3187	10.3076622	47
14	9.6454496	2562	9.9510687	623	9.6926565	3185	10.3073435	46
15	9.6457058	2561	9.9508836	623	9.6929750	3184	10.3070250	45
16	9.6459619	2559	9.9506985	624	9.6932934	3182	10.3067066	44
17	9.6462178	2557	9.9505134	624	9.6936117	3181	10.3063883	43
18	9.6464735	2555	9.9503283	624	9.6939298	3180	10.3060702	42
19	9.6467290	2554	9.9501432	625	9.6942478	3178	10.3057522	41
20	9.6469844	2551	9.9500000	626	9.6945656	3177	10.3054344	40
		2550		626		3176		
21	9.6472395	2547	9.9498149	626	9.6948833	3174	10.3051167	39
22	9.6474945	2546	9.9496298	627	9.6952009	3172	10.3047991	38
23	9.6477492	2544	9.9494447	628	9.6955183	3171	10.3044817	37
24	9.6480038	2542	9.9492596	627	9.6958355	3170	10.3041645	36
25	9.6482582	2541	9.9490745	629	9.6961527	3168	10.3038473	35
26	9.6485124	2538	9.9488894	628	9.6964697	3167	10.3035302	34
27	9.6487665	2537	9.9487043	629	9.6967865	3166	10.3032135	33
28	9.6490202	2534	9.9485192	629	9.6971032	3165	10.3028968	32
29	9.6492740		9.9483341		9.6974198		10.3025802	31
30	9.6495274		9.9481490		9.6977363		10.3022637	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus

G. 26

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. Co.	L. Cot.	
30	9.6495274		9.9517912		9.6977363		10.3022637	30
		2533		630		3163		
31	9.6497807		9.9517282		9.6980526		10.3019474	29
32	9.6500238	2531	9.9516651	631	9.6983687	3161	10.3016313	28
33	9.6502868	2530	9.9516020	631	9.6986847	3160	10.3013153	27
34	9.6505395	2527	9.9515389	631	9.6990006	3159	10.3009994	26
35	9.6507920	2525	9.9514757	632	9.6993164	3158	10.3006836	25
36	9.6510444	2524	9.9514124	633	9.6996320	3156	10.3003680	24
37	9.6512966	2522	9.9513492	632	9.6999474	3154	10.3000526	23
38	9.6515486	2520	9.9512858	634	9.7002628	3154	10.2997372	22
39	9.6518004	2518	9.9512224	634	9.7005780	3152	10.2994220	21
40	9.6520521	2517	9.9511590	634	9.7008930	3150	10.2991070	20
		2514		634		3150		
41	9.6523035	2513	9.9510956	636	9.7012080		10.2987920	19
42	9.6525548	2511	9.9510320	635	9.7015227	3147	10.2984773	18
43	9.6528059	2509	9.9509685	635	9.7018374	3147	10.2981626	17
44	9.6530568	2507	9.9509049	636	9.7021519	3145	10.2978481	16
45	9.6533075	2505	9.9508412	637	9.7024663	3144	10.2975337	15
46	9.6535581	2503	9.9507775	637	9.7027805	3142	10.2972195	14
47	9.6538084	2502	9.9507138	637	9.7030946	3141	10.2969054	13
48	9.6540586	2500	9.9506500	638	9.7034086	3140	10.2965914	12
49	9.6543085	2498	9.9505861	638	9.7037225	3139	10.2962775	11
50	9.6545584		9.9505223	638	9.7040362	3137	10.2959638	10
		2497		640		3135		
51	9.6548081	2494	9.9504583	639	9.7043497		10.2956503	9
52	9.6550575	2493	9.9503944	641	9.7046632	3135	10.2953368	8
53	9.6553068	2491	9.9503303	640	9.7049765	3133	10.2950235	7
54	9.6555559	2489	9.9502663	641	9.7052897	3132	10.2947103	6
55	9.6558048	2488	9.9502022	641	9.7056027	3130	10.2943973	5
56	9.6560536	2485	9.9501380	642	9.7059156	3129	10.2940844	4
57	9.6563021	2484	9.9500738	642	9.7062284	3128	10.2937716	3
58	9.6565505	2482	9.9500095	643	9.7065410	3126	10.2934590	2
59	9.6567987	2481	9.9499452	643	9.7068535	3125	10.2931465	1
60	9.6570468		9.9498809		9.7071659	3124	10.2928341	0

	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 63

Y 2

Sinus			Cosinus			Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.6570468		9.9458809		9.7071659		10.2928341	60
		2478		644		3122		
1	9.6572946		9.9498165		9.7074781		10.2925219	59
2	9.6575423	2477	9.9497721	644	9.7077902	3121	10.2922098	58
3	9.6577898	2475	9.9496876	645	9.7081022	3120	10.2918978	57
4	9.6580371	2473	9.9496230	646	9.7084141	3119	10.2915859	56
5	9.6582842	2471	9.9495585	645	9.7087268	3117	10.2912742	55
6	9.6585312	2470	9.9494938	647	9.7090374	3116	10.2909626	54
7	9.6587800	2468	9.9494292	646	9.7093488	3114	10.2906512	53
8	9.6590246	2466	9.9493645	647	9.7096601	3113	10.2903399	52
9	9.6592710	2464	9.9492997	648	9.7099713	3112	10.2900287	51
10	9.6595173	2463	9.9492349	648	9.7102824	3111	10.2897176	50
		2461		649		3109		
11	9.6597634		9.9491700		9.7105933		10.2894067	49
12	9.6600093	2459	9.9491051	649	9.7109041	3108	10.2890959	48
13	9.6602550	2457	9.9490402	649	9.7112148	3107	10.2887852	47
14	9.6605005	2455	9.9489752	650	9.7115254	3106	10.2884746	46
15	9.6607459	2454	9.9489101	651	9.7118358	3104	10.2881642	45
16	9.6609911	2452	9.9488450	651	9.7121461	3103	10.2878539	44
17	9.6612361	2450	9.9487799	652	9.7124562	3101	10.2875438	43
18	9.6614810	2449	9.9487147	652	9.7127662	3100	10.2872338	42
19	9.6617257	2447	9.9486495	652	9.7130761	3099	10.2869239	41
20	9.6619701	2444	9.9485842	653	9.7133859	3098	10.2866141	40
		2444		653		3097		
21	9.6622145		9.9485189		9.7136956		10.2863044	39
22	9.6624586	2441	9.9484535	654	9.7140051	3095	10.2859949	38
23	9.6627026	2440	9.9483881	654	9.7143145	3094	10.2856855	37
24	9.6629464	2438	9.9483227	654	9.7146237	3092	10.2853763	36
25	9.6631900	2436	9.9482572	655	9.7149329	3092	10.2850671	35
26	9.6634335	2435	9.9481916	656	9.7152419	3090	10.2847581	34
27	9.6636768	2433	9.9481260	656	9.7155508	3089	10.2844492	33
28	9.6639199	2431	9.9480604	656	9.7158595	3087	10.2841405	32
29	9.6641628	2429	9.9479947	657	9.7161682	3087	10.2838318	31
30	9.6644056	2428	9.9479289	658	9.7164767	3085	10.2835233	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 62

Sinus			G. 27		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.
30	9.6644056		9.9479289		9.7164767		10.2835233
		2426		658		3084	
31	9.6646482		9.9478631		9.7167851		10.2832149
32	9.6648906	2424	9.9477973	658	9.7170933	3082	10.2829067
33	9.6651329	2423	9.9477314	659	9.7174014	3081	10.2825986
34	9.6653749	2420	9.9476655	659	9.7177094	3080	10.2822906
35	9.6656168	2419	9.9475995	660	9.7180173	3079	10.2819827
36	9.6658586	2418	9.9475335	660	9.7183251	3078	10.2816749
37	9.6661001	2415	9.9474674	661	9.7186327	3076	10.2813672
38	9.6663415	2414	9.9474013	661	9.7189402	3075	10.2810598
39	9.6665828	2413	9.9473352	661	9.7192476	3074	10.2807524
40	9.6668238	2410	9.9472689	663	9.7195549	3073	10.2804451
		2409		662		3071	
41	9.6670647	2407	9.9472027	662	9.7198620	3070	10.2801380
42	9.6673054	2405	9.9471364	664	9.7201690	3069	10.2798310
43	9.6675459	2404	9.9470700	664	9.7204759	3068	10.2795241
44	9.6677863	2402	9.9470036	664	9.7207827	3066	10.2792173
45	9.6680265	2400	9.9469372	665	9.7210892	3065	10.2789107
46	9.6682665	2399	9.9468707	665	9.7213958	3064	10.2786042
47	9.6685064	2397	9.9468042	666	9.7217022	3063	10.2782978
48	9.6687461	2395	9.9467376	666	9.7220085	3062	10.2779915
49	9.6689856	2394	9.9466710	667	9.7223147	3060	10.2776853
50	9.6692250		9.9466043		9.7226207		10.2773793
		2392		667		3059	
51	9.6694642	2390	9.9465376	668	9.7229266	3058	10.2770734
52	9.6697032	2388	9.9464708	668	9.7232324	3057	10.2767676
53	9.6699420	2387	9.9464040	669	9.7235381	3055	10.2764619
54	9.6701807	2385	9.9463371	669	9.7238436	3054	10.2761564
55	9.6704192	2384	9.9462702	670	9.7241490	3053	10.2758510
56	9.6706576	2382	9.9462032	670	9.7244543	3052	10.2755457
57	9.6708958	2380	9.9461362	670	9.7247595	3051	10.2752405
58	9.6711338	2378	9.9460692	671	9.7250646	3049	10.2749354
59	9.6713716	2377	9.9460021	672	9.7253695	3047	10.2746305
60	9.6716093		9.9459349		9.7256744		10.2743256
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 62

SINUS

G. 28

TANGENTES

M	L. Sin.	Diff.	L. Cof.	D.	L. Tan.	D. co.	L. Cot.	
0	9.671693		9.9459349		9.7256744		10.2743256	60
		2375		672		3047		
1	9.6718468		9.9458677		9.7259791		10.2740209	59
2	9.6720841	2372	9.9458005	672	9.7262837	3046	10.2737163	58
3	9.6723212	2372	9.9457332	673	9.7265881	3044	10.2734119	57
4	9.6725583	2370	9.9456659	673	9.7268925	3044	10.2731075	56
5	9.6727952	2369	9.9455985	674	9.7271967	3042	10.2728031	55
6	9.6730319	2367	9.9455310	675	9.7275008	3041	10.2724992	54
7	9.6732684	2365	9.9454636	674	9.7278048	3040	10.2721952	53
8	9.6735047	2362	9.9453960	676	9.7281087	3039	10.2718913	52
9	9.6737409	2362	9.9453285	675	9.7284124	3037	10.2715876	51
10	9.6739769	2360	9.9452609	676	9.7287161	3037	10.2712839	50
		2359		677		3035		
11	9.6742128		9.9451932		9.7290196		10.2709804	49
12	9.6744485	2357	9.9451255	677	9.7293220	3034	10.2706770	48
13	9.6746840	2355	9.9450577	678	9.7296263	3033	10.2703737	47
14	9.6749194	2354	9.9449899	6-8	9.7299295	3032	10.2700705	46
15	9.6751546	2352	9.9449220	679	9.7302325	3030	10.2697675	45
16	9.6753895	2350	9.9448541	6-9	9.7305354	3029	10.2694646	44
17	9.6756245	2349	9.9447862	6-9	9.7308383	3029	10.2691617	43
18	9.6758592	2347	9.9447182	680	9.7311410	3027	10.2688590	42
19	9.6760927	2345	9.9446501	681	9.7314436	3026	10.2685564	41
20	9.6763281	2344	9.9445821	680	9.7317460	3024	10.2682540	40
		2342		682		3024		
21	9.6765623	2340	9.9445139	682	9.7320484	3022	10.2679516	39
22	9.6767963	2339	9.9444457	682	9.7323506	3021	10.2676494	38
23	9.6770302	2338	9.9443775	683	9.7326527	3020	10.2673473	37
24	9.6772640	2335	9.9443092	683	9.7329547	3019	10.2670453	36
25	9.6774975	2334	9.9442409	684	9.7332566	3018	10.2667424	35
26	9.6777309	2333	9.9441725	684	9.7335584	3017	10.2664416	34
27	9.6779642	2330	9.9441041	685	9.7338601	3015	10.2661399	33
28	9.6781972	2329	9.9440356	685	9.7341616	3015	10.2658384	32
19	9.6784301	2328	9.9439671	686	9.7344631	3013	10.2655369	31
20	9.6786629		9.9438985		9.7347644		10.2652356	30
	L. Cof.		L. Sin.		L. Cot.		L. Tan.	M

G. 61

Sinus			G. 28		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
30	9 6786629		9 9438985		9 7347644		10 2652256
		2327		686		3012	
31	9 6758955		9 9438599	687	9 7350656		10 2649244
32	9 6791279	2324	9 9437612	687	9 7353667	3011	10 2646333
33	9 6793602	2323	9 9436925	687	9 7356677	3010	10 2643323
34	9 6795922	2321	9 9436238	689	9 7359685	3008	10 2640315
35	9 6798243	2320	9 9435549	688	9 7362693	3008	10 2637307
36	9 6800560	2317	9 9434861	689	9 7365699	3006	10 2634301
37	9 6802877	2317	9 9434172	690	9 7368705	3006	10 2631295
38	9 6805191	2314	9 9433482	690	9 7371709	3004	10 2628291
39	9 6807504	2313	9 9432792	690	9 7374712	3003	10 2625288
40	9 6809816	2312	9 9432102	690	9 7377714	3002	10 2622286
		2310		691		3001	
41	9 6812126	2308	9 9431411	691	9 7380715	2999	10 2619285
42	9 6814434	2307	9 9430720	692	9 7383714	2999	10 2616286
43	9 6816741	2305	9 9430028	693	9 7386713	2997	10 2613287
44	9 6819046	2303	9 9429335	692	9 7389710	2997	10 2610290
45	9 6821349	2302	9 9428643	694	9 7392707	2995	10 2607293
46	9 6823651	2301	9 9427949	694	9 7395702	2994	10 2604298
47	9 6825952	2298	9 9427255	694	9 7398696	2993	10 2601304
48	9 6828250	2298	9 9426561	695	9 7401689	2992	10 2598311
49	9 6830548	2295	9 9425866	695	9 7404681	2991	10 2595319
50	9 6832843		9 9425171		9 7407672		10 2592328
		2294		695		2990	
51	9 6835137	2293	9 9424476	697	9 7410662	2988	10 2589338
52	9 6837430	2290	9 9423779	696	9 7413650	2988	10 2586350
53	9 6839720	2290	9 9423082	697	9 7416638	2986	10 2583362
54	9 6842010	2287	9 9422386	698	9 7419624	2985	10 2580376
55	9 6844297	2286	9 9421688	698	9 7422609	2985	10 2577391
56	9 6846583	2285	9 9420990	699	9 7425594	2982	10 2574406
57	9 6848868	2282	9 9420291	699	9 7428577	2982	10 2571423
58	9 6851151	2281	9 9419592	699	9 7431559	2981	10 2568441
59	9 6853432	2280	9 9418893	700	9 7434540	2980	10 2565460
60	9 6855712		9 9418193		9 7437520		10 2562480
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 61

Sinus			G. 29		Tangentes			
M	L.Sin.	Diff.	L.Cof.	D.	L.Tan.	D.co.	L.Cot.	
0	9.6855712		9.9418193		9.7437520		10.2562480	60
		2279		701		2979		
1	9.6857991		9.9417492		9.7440499		10.2559501	59
2	9.6860267	2276	9.9416791	701	9.7443476	2977	10.2556524	58
3	9.6862542	2275	9.9416090	701	9.7446453	2977	10.2553547	57
4	9.6864816	2274	9.9415388	702	9.7449428	2975	10.2550572	56
5	9.6867088	2272	9.9414685	702	9.7452403	2975	10.2547597	55
6	9.6869359	2271	9.9413982	703	9.7455376	2973	10.2544624	54
7	9.6871628	2269	9.9413279	703	9.7458349	2973	10.2541651	53
8	9.6873895	2267	9.9412575	704	9.7461320	2971	10.2538680	52
9	9.6876161	2266	9.9411871	704	9.7464290	2970	10.2535710	51
10	9.6878425	2264	9.9411166	705	9.7467159	2969	10.2532741	50
		2263		705		2968		
11	9.6880688	2261	9.9410461	706	9.7470227	2967	10.2529772	49
12	9.6882949	2260	9.9409755	707	9.7473194	2966	10.2526806	48
13	9.6885209	2258	9.9409048	706	9.7476160	2965	10.2523840	47
14	9.6887467	2256	9.9408342	708	9.7479125	2964	10.2520875	46
15	9.6889723	2255	9.9407634	707	9.7482089	2963	10.2517911	45
16	9.6891978	2254	9.9406927	708	9.7485052	2961	10.2514948	44
17	9.6894232	2252	9.9406219	709	9.7488013	2961	10.2511987	43
18	9.6896484	2250	9.9405510	709	9.7490974	2960	10.2509026	42
19	9.6898734	2249	9.9404801	710	9.7493934	2958	10.2506066	41
20	9.6900983		9.9404091		9.7496892		10.2503108	40
		2248		710		2958		
21	9.6903231	2245	9.9403381	711	9.7499850	2956	10.2500150	39
22	9.6905476	2245	9.9402670	711	9.7502806	2956	10.2497194	38
23	9.6907721	2243	9.9401959	711	9.7505762	2954	10.2494238	37
24	9.6909964	2241	9.9401248	713	9.7508716	2952	10.2491284	36
25	9.6912205	2240	9.9400535	712	9.7511669	2953	10.2488331	35
26	9.6914445	2238	9.9399823	712	9.7514622	2951	10.2485378	34
27	9.6916683	2236	9.9399110	714	9.7517573	2950	10.2482427	33
28	9.6918919	2236	9.9398396	714	9.7520523	2949	10.2479477	32
29	9.6921155	2233	9.9397682	714	9.7523472	2948	10.2476528	31
30	9.6923388		9.9396968		9.7526420		10.2473580	30
	L. Cof.		L. Sin.		L. Cot.		L. Tan.	M

G. 60

Sinus

G. 29

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.6923388		9.9395968		9.7516420		10.2473380	30
		2232		715		2948		
31	9.6925620		9.9396253		9.7529368		10.2470622	29
32	9.6927851	2231	9.9395537	716	9.7532314	2946	10.2467686	28
33	9.6930080	2229	9.9394821	716	9.7535259	2945	10.2464741	27
34	9.6932308	2228	9.9394105	716	9.7538203	2944	10.2461797	26
35	9.6934534	2226	9.9393388	717	9.7541146	2942	10.2458854	25
36	9.6936758	2224	9.9392671	717	9.7544088	2942	10.2455912	24
37	9.6938981	2223	9.9391953	718	9.7547029	2941	10.2452971	23
38	9.6941203	2222	9.9391234	719	9.7549969	2940	10.2450031	22
39	9.6943423	2220	9.9390515	719	9.7552908	2939	10.2447092	21
40	9.6945642	2219	9.9389796	719	9.7555846	2938	10.2444154	20
		2217		720		2937		
41	9.6947859	2215	9.9389076	720	9.7558783	2935	10.2441217	19
42	9.6950074	2214	9.9388356	721	9.7561718	2935	10.2438282	18
43	9.6952288	2213	9.9387635	721	9.7564653	2934	10.2435347	17
44	9.6954501	2211	9.9386914	722	9.7567587	2933	10.2432413	16
45	9.6956712	2210	9.9386192	722	9.7570520	2932	10.2429480	15
46	9.6958922	2208	9.9385470	723	9.7573452	2931	10.2426548	14
47	9.6961130	2206	9.9384747	723	9.7576383	2930	10.2423617	13
48	9.6963336	2205	9.9384024	724	9.7579313	2929	10.2420687	12
49	9.6965541	2204	9.9383300	724	9.7582242	2928	10.2417758	11
50	9.6967745		9.9382576		9.7585170		10.2414830	10
		2202		725		2926		
51	9.6969947	2201	9.9381851	725	9.7588096	2926	10.2411904	9
52	9.6972148	2199	9.9381126	726	9.7591022	2925	10.2408978	8
53	9.6974347	2198	9.9380400	726	9.7593947	2924	10.2406053	7
54	9.6976545	2196	9.9379674	727	9.7596871	2923	10.2403129	6
55	9.6978741	2195	9.9378947	727	9.7599794	2922	10.2400206	5
56	9.6980936	2193	9.9378220	728	9.7602716	2921	10.2397284	4
57	9.6983126	2192	9.9377492	728	9.7605637	2920	10.2394363	3
58	9.6985321	2190	9.9376764	729	9.7608557	2919	10.2391443	2
59	9.6987511	2189	9.9376035	729	9.7611476	2918	10.2388524	1
60	9.6989700		9.9375306		9.7614394		10.2385606	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 60

Z

Sine			G. 30		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.6989700		9.9275306		9.7614394		10.2385606	60
		2187		729		2917		
1	9.6991887	2186	9.9274577	730	9.7617211	2916	10.2382689	59
2	9.6994073	2185	9.9273847	731	9.7620227	2915	10.2379772	58
3	9.6996258	2182	9.9273116	731	9.7622142	2914	10.2376858	57
4	9.6998441	2181	9.9272385	732	9.7626056	2913	10.2373944	56
5	9.7000622	2180	9.9271653	732	9.7628969	2912	10.2371021	55
6	9.7002802	2179	9.9270921	732	9.7631881	2911	10.2368119	54
7	9.7004981	2177	9.9270189	733	9.7634792	2910	10.2365208	53
8	9.7007158	2176	9.9269456	734	9.7637702	2910	10.2362298	52
9	9.7009334	2174	9.9268722	734	9.7640612	2908	10.2359388	51
10	9.7011508		9.9267988		9.7643520		10.2356480	50
		2173		734		2907		
11	9.7013681	2171	9.9267254	735	9.7646427	2907	10.2353573	49
12	9.7015852	2170	9.9266519	736	9.7649334	2905	10.2350666	48
13	9.7018022	2168	9.9265783	735	9.7652239	2904	10.2347761	47
14	9.7020190	2167	9.9265047	736	9.7655143	2904	10.2344857	46
15	9.7022357	2166	9.9264311	737	9.7658047	2902	10.2341953	45
16	9.7024522	2164	9.9263574	738	9.7660949	2902	10.2339051	44
17	9.7026687	2162	9.9262836	738	9.7663851	2900	10.2336149	43
18	9.7028849	2162	9.9262098	738	9.7666751	2900	10.2333249	42
19	9.7031011	2159	9.9261360	739	9.7669651	2899	10.2330349	41
20	9.7033170		9.9260621		9.7672550		10.2327450	40
		2159		740		2898		
21	9.7035329	2157	9.9259881	740	9.7675448	2896	10.2324552	39
22	9.7037486	2155	9.9259141	740	9.7678344	2896	10.2321656	38
23	9.7039641	2154	9.9258401	741	9.7681240	2895	10.2318760	37
24	9.7041795	2152	9.9257660	742	9.7684135	2894	10.2315865	36
25	9.7043947	2152	9.9256918	741	9.7687029	2893	10.2312971	35
26	9.7046099	2151	9.9256177	742	9.7689922	2892	10.2310078	34
27	9.7048248	2148	9.9255434	742	9.7692814	2891	10.2307186	33
28	9.7050397	2146	9.9254691	742	9.7695705	2891	10.2304295	32
29	9.7052542	2146	9.9253948	744	9.7698596	2889	10.2301404	31
30	9.7054689		9.9253204		9.7701485		10.2298515	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Ct. 59

Sinus			G. 30		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.7054689		9.9353204		9.7701485		10.2298515	30
		2144		745		2888		
31	9.7056823		9.9352459		9.7704373		10.2295627	29
32	9.7058975	2142	9.9351715	744	9.7707261	2888	10.2292729	28
33	9.7061116	2141	9.9350969	746	9.7710147	2886	10.2289833	27
34	9.7063256	2140	9.9350223	745	9.7713033	2886	10.2286967	26
35	9.7065394	2138	9.9349477	746	9.7715917	2884	10.2284082	25
36	9.7067531	2137	9.9348730	747	9.7718801	2884	10.2281199	24
37	9.7069667	2136	9.9347983	747	9.7721684	2882	10.2278316	23
38	9.7071801	2134	9.9347235	748	9.7724566	2882	10.2275434	22
39	9.7073933	2132	9.9346486	749	9.7727447	2881	10.2272552	21
40	9.7076064	2131	9.9345738	748	9.7730327	2880	10.2269673	20
		2130		750		2879		
41	9.7078194	2129	9.9344988		9.7733206	2878	10.2266794	19
42	9.7080323	2127	9.9344238	750	9.7736084	2877	10.2263916	18
43	9.7082450	2125	9.9343488	750	9.7738961	2877	10.2261039	17
44	9.7084575	2124	9.9342737	751	9.7741838	2877	10.2258162	16
45	9.7086699	2123	9.9341986	751	9.7744712	2875	10.2255287	15
46	9.7088822	2121	9.9341234	752	9.7747588	2875	10.2252412	14
47	9.7090943	2120	9.9340482	752	9.7750462	2874	10.2249538	13
48	9.7093063	2119	9.9339729	753	9.7753334	2872	10.2246666	12
49	9.7095182	2117	9.9338976	753	9.7756206	2872	10.2243794	11
50	9.7097299	2116	9.9338222	754	9.7759077	2871	10.2240923	10
		2116		755		2870		
51	9.7099415	2114	9.9337467	754	9.7761947	2869	10.2238053	9
52	9.7101529	2113	9.9336713	756	9.7764816	2869	10.2235184	8
53	9.7103642	2111	9.9335957	756	9.7767685	2867	10.2232315	7
54	9.7105753	2110	9.9335201	756	9.7770552	2867	10.2229448	6
55	9.7107863	2109	9.9334445	757	9.7773418	2866	10.2226582	5
56	9.7109972	2108	9.9333688	757	9.7776284	2865	10.2223716	4
57	9.7112080	2106	9.9332931	758	9.7779149	2863	10.2220851	3
58	9.7114186	2105	9.9332173	758	9.7782012	2863	10.2217988	2
59	9.7116290	2103	9.9331415	759	9.7784875	2862	10.2215125	1
60	9.7118393	2103	9.9330656		9.7787737		10.2212263	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 59

G. 59

Z 2

Sinus			G 31		Tangentes			
M	L. Sin.	Diff.	L. Cof.	D.	L. Tan.	D.co.	L. Cot.	
0	9.7118393		9.9330656		9.7787737		10.2112163	60
		2102		759		2862		
1	9.7120495		9.9329857		9.7790599		10.2209401	59
2	9.7122596	2101	9.9329137	760	9.7793459	2850	10.2206541	58
3	9.7124695	2099	9.9328376	761	9.7796318	2859	10.2203682	57
4	9.7126792	2097	9.9327616	760	9.7799177	2859	10.2200823	56
5	9.7128889	2097	9.9326854	762	9.7802034	2857	10.2197966	55
6	9.7130983	2094	9.9326092	762	9.7804891	2857	10.2195109	54
7	9.7133077	2094	9.9325330	762	9.7807747	2856	10.2192253	53
8	9.7135169	2092	9.9324567	763	9.7810602	2855	10.2189398	52
9	9.7137260	2091	9.9323804	763	9.7813456	2854	10.2186543	51
10	9.7139349	2089	9.9323040	764	9.7816309	2853	10.2183691	50
		2088		764		2853		
11	9.7141437		9.9322276		9.7819162		10.2180838	49
12	9.7143524	2087	9.9321511	765	9.7822013	2851	10.2177987	48
13	9.7145609	2085	9.9320746	765	9.7824864	2851	10.2175136	47
14	9.7147692	2084	9.9319980	766	9.7827712	2849	10.2172287	46
15	9.7149776	2082	9.9319213	767	9.7830562	2849	10.2169438	45
16	9.7151857	2081	9.9318447	766	9.7833410	2848	10.2166590	44
17	9.7153927	2080	9.9317679	768	9.7836258	2848	10.2163742	43
18	9.7156015	2078	9.9316911	768	9.7839104	2846	10.2160896	42
19	9.7158092	2077	9.9316143	768	9.7841949	2845	10.2158051	41
20	9.7160168	2076	9.9315374	769	9.7844794	2845	10.2155206	40
		2075		769		2244		
21	9.7162242		9.9314605		9.7847628		10.2152362	39
22	9.7164316	2075	9.9313835	770	9.7850481	2843	10.2149519	38
23	9.7166387	2071	9.9313065	771	9.7853323	2841	10.2146677	37
24	9.7168458	2071	9.9312294	772	9.7856164	2840	10.2143836	36
25	9.7170526	2068	9.9311522	772	9.7859004	2840	10.2140996	35
26	9.7172594	2066	9.9310750	772	9.7861844	2838	10.2138156	34
27	9.7174660	2065	9.9309978	773	9.7864682	2838	10.2135318	33
28	9.7176725	2064	9.9309205	773	9.7867520	2837	10.2132480	32
29	9.7178789	2062	9.9308432	774	9.7870357	2836	10.2129643	31
30	9.7180851		9.9307658		9.7873193		10.2126807	30
	L. Cof.		L. Sin.		L. Cot.		L. Tan.	M

G. 58

Sinus			C. 31		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.7180851		9.9307658		9.7873193		10.2126807	30
—	—	1061	—	775	—	2835	—	—
31	9.7181912		9.9306883		9.7876018		10.2123972	29
32	9.7184971	1059	9.9306109	774	9.7878862	2835	10.2121117	28
33	9.7187030	1059	9.9305333	776	9.7881696	2833	10.2118204	27
34	9.7189066	1056	9.9304557	776	9.7884529	2833	10.2115471	26
35	9.7191142	1056	9.9303781	776	9.7887361	2832	10.2112619	25
36	9.7193196	1054	9.9303004	777	9.7890192	2831	10.2109808	24
37	9.7195249	1053	9.9302226	778	9.7893023	2831	10.2106977	23
38	9.7197300	1051	9.9301448	778	9.7895852	2829	10.2104148	22
39	9.7199350	1050	9.9300670	778	9.7898681	2829	10.2101319	21
40	9.7201399	1049	9.9299891	779	9.7901508	2827	10.2098492	20
—	—	1048	—	779	—	2827	—	—
41	9.7203447	1046	9.9299112	780	9.7904335	2826	10.2095665	19
42	9.7205492	1045	9.9298332	781	9.7907161	2826	10.2092839	18
43	9.7207538	1043	9.9297551	781	9.7909987	2824	10.2090013	17
44	9.7209581	1042	9.9296770	781	9.7912811	2824	10.2087189	16
45	9.7211623	1041	9.9295989	782	9.7915635	2823	10.2084365	15
46	9.7213664	1040	9.9295207	783	9.7918458	2822	10.2081542	14
47	9.7215704	1038	9.9294424	783	9.7921280	2821	10.2078720	13
48	9.7217742	1037	9.9293641	784	9.7924101	2820	10.2075899	12
49	9.7219779	1035	9.9292857	784	9.7926921	2820	10.2073079	11
50	9.7221814	1034	9.9292073	784	9.7929741	2819	10.2070259	10
—	—	1034	—	784	—	2819	—	—
51	9.7223848	1033	9.9291289	785	9.7932560	2818	10.2067440	9
52	9.7225881	1032	9.9290504	786	9.7935378	2817	10.2064622	8
53	9.7227913	1030	9.9289718	786	9.7938195	2816	10.2061805	7
54	9.7229943	1029	9.9288932	787	9.7941011	2816	10.2058989	6
55	9.7231972	1028	9.9288145	787	9.7943827	2814	10.2056173	5
56	9.7234000	1026	9.9287358	787	9.7946641	2814	10.2053359	4
57	9.7236026	1025	9.9286571	788	9.7949455	2813	10.2050545	3
58	9.7238051	1024	9.9285783	789	9.7952268	2813	10.2047732	2
59	9.7240075	1022	9.9284994	789	9.7955081	2811	10.2044919	1
60	9.7242097	1021	9.9284205	—	9.7957892	—	10.2042108	0
—	—	—	—	—	—	—	—	—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 58

Sinus		G. 32		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D	L. Tan.	D co.	L. Cot.
0	9.7241097		9.9284205		9.7957892		10.2042108
1	9.7244118	1021	9.9283215	790	9.7960703	1811	10.2039297
2	9.7246138	2020	9.9282225	790	9.7963513	1810	10.2036487
3	9.7248156	2018	9.9281234	791	9.7966322	1809	10.2033678
4	9.7250174	2018	9.9280243	791	9.7969130	1808	10.2030870
5	9.7252189	2015	9.9280251	792	9.7971938	1808	10.2028062
6	9.7254204	2015	9.9279459	792	9.7974745	1807	10.2025255
7	9.7256217	2013	9.9278666	793	9.7977551	1806	10.2022449
8	9.7258229	2012	9.9277873	793	9.7980356	1805	10.2019644
9	9.7260240	2011	9.9277079	794	9.7983160	1804	10.2016840
10	9.7262249	2009	9.9276285	794	9.7985964	1804	10.2014036
11	9.7264257	2008	9.9275490	795	9.7988767	1803	10.2011233
12	9.7266264	2007	9.9274695	795	9.7991569	1802	10.2008431
13	9.7268269	2005	9.9273899	796	9.7994370	1801	10.2005620
14	9.7270273	2004	9.9273103	796	9.7997170	1800	10.2002810
15	9.7272276	2003	9.9272306	797	9.7999970	1800	10.2000030
16	9.7274278	2002	9.9271509	797	9.8002769	1799	10.1997231
17	9.7276278	2000	9.9270711	798	9.8005567	1798	10.1994433
18	9.7278277	1999	9.9269913	798	9.8008365	1798	10.1991635
19	9.7280275	1998	9.9269114	799	9.8011161	1796	10.1988839
20	9.7282271	1996	9.9268314	800	9.8013957	1795	10.1986043
21	9.7284267	1993	9.9267514	800	9.8016752	1794	10.1983248
22	9.7286260	1993	9.9266714	801	9.8019546	1794	10.1980454
23	9.7288253	1991	9.9265913	801	9.8022340	1793	10.1977660
24	9.7290244	1990	9.9265112	802	9.8025133	1792	10.1974867
25	9.7292234	1989	9.9264310	803	9.8027925	1791	10.1972075
26	9.7294223	1988	9.9263507	803	9.8030716	1790	10.1969284
27	9.7296211	1986	9.9262704	803	9.8033506	1790	10.1966494
28	9.7298197	1985	9.9261901	805	9.8036296	1789	10.1963704
29	9.7300182	1983	9.9261096	804	9.8039085	1788	10.1960915
30	9.7302165		9.9260292		9.8041873		10.1958127
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

Sinus

G. 32

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.7302165	1983	9.9260292	805	9.8041873	2788	10.1958127	30
31	9.7304148	1981	9.9259487	806	9.8044661	2786	10.1955339	29
32	9.7306129	1980	9.9258681	806	9.8047447	2786	10.1952553	28
33	9.7308109	1978	9.9257875	806	9.8050233	2786	10.1949767	27
34	9.7310087	1977	9.9257069	808	9.8053019	2784	10.1946981	26
35	9.7312064	1976	9.9256261	807	9.8055803	2784	10.1944197	25
36	9.7314040	1975	9.9255454	808	9.8058587	2783	10.1941413	24
37	9.7316015	1974	9.9254646	809	9.8061370	2782	10.1938630	23
38	9.7317989	1972	9.9253837	809	9.8064152	2781	10.1935848	22
39	9.7319961	1971	9.9253028	810	9.8066933	2781	10.1933067	21
40	9.7321932	1970	9.9252218	810	9.8069714	2780	10.1930286	20
41	9.7323902	1968	9.9251408	811	9.8072494	2779	10.1927506	19
42	9.7325870	1967	9.9250597	811	9.8075273	2779	10.1924727	18
43	9.7327835	1966	9.9249786	812	9.8078052	2777	10.1921948	17
44	9.7329803	1965	9.9248974	812	9.8080829	2777	10.1919171	16
45	9.7331768	1963	9.9248161	812	9.8083606	2777	10.1916394	15
46	9.7333731	1962	9.9247349	814	9.8086383	2775	10.1913617	14
47	9.7335693	1961	9.9246535	814	9.8089158	2775	10.1910842	13
48	9.7337654	1960	9.9245721	814	9.8091933	2774	10.1908067	12
49	9.7339614	1958	9.9244907	815	9.8094707	2773	10.1905293	11
50	9.7341572	1957	9.9244092	815	9.8097480	2773	10.1902520	10
51	9.7343529	1956	9.9243277	816	9.8100253	2772	10.1899747	9
52	9.7345485	1955	9.9242461	817	9.8103025	2771	10.1896975	8
53	9.7347440	1953	9.9241644	817	9.8105796	2770	10.1894204	7
54	9.7349393	1952	9.9240827	817	9.8108566	2770	10.1891434	6
55	9.7351345	1951	9.9240010	819	9.8111336	2769	10.1888664	5
56	9.7353296	1950	9.9239191	818	9.8114105	2768	10.1885895	4
57	9.7355246	1949	9.9238373	819	9.8116873	2768	10.1883127	3
58	9.7357195	1947	9.9237554	820	9.8119641	2767	10.1880359	2
59	9.7359142	1946	9.9236734	820	9.8122408	2766	10.1877592	1
60	9.7361088		9.9235914		9.8125174		10.1874826	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sine		G. 33		Tangentes				
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.7361088		9.9235914		9.8125174		10.1874826	60
—	—	1944	—	821	—	2765	—	—
1	9.7363032		9.9235093		9.8127939		10.1872061	59
2	9.7364976	1944	9.9234272	821	9.8130704	2765	10.1869296	58
3	9.7366918	1942	9.9233450	822	9.8133468	2764	10.1866532	57
4	9.7368859	1941	9.9232628	822	9.8136231	2763	10.1863769	56
5	9.7370799	1940	9.9231805	823	9.8138993	2762	10.1861007	55
6	9.7372737	1938	9.9230982	823	9.8141755	2761	10.1858245	54
7	9.7374675	1938	9.9230158	824	9.8144516	2761	10.1855484	53
8	9.7376611	1936	9.9229334	824	9.8147277	2761	10.1852723	52
9	9.7378546	1935	9.9228509	825	9.8150036	2759	10.1849964	51
10	9.7380479	1933	9.9227684	825	9.8152795	2759	10.1847205	50
—	—	1933	—	826	—	2759	—	—
11	9.7382412	1931	9.9226858	826	9.8155554	2757	10.1844446	49
12	9.7384343	1930	9.9226032	827	9.8158311	2757	10.1841689	48
13	9.7386273	1928	9.9225205	828	9.8161068	2756	10.1838932	47
14	9.7388201	1928	9.9224377	828	9.8163824	2756	10.1836176	46
15	9.7390129	1926	9.9223549	828	9.8166580	2755	10.1833420	45
16	9.7392055	1925	9.9222721	830	9.8169335	2755	10.1830665	44
17	9.7393980	1924	9.9221891	829	9.8172089	2754	10.1827911	43
18	9.7395904	1923	9.9221062	830	9.8174842	2753	10.1825158	42
19	9.7397827	1921	9.9220232	831	9.8177595	2753	10.1822405	41
20	9.7399748	1920	9.9219401	831	9.8180347	2752	10.1819653	40
—	—	1920	—	831	—	2751	—	—
21	9.7401668	1910	9.9218570	832	9.8183098	2751	10.1816902	39
22	9.7403587	1918	9.9217738	832	9.8185849	2750	10.1814151	38
23	9.7405505	1916	9.9216905	833	9.8188599	2749	10.1811401	37
24	9.7407421	1916	9.9216073	833	9.8191348	2748	10.1808652	36
25	9.7409337	1914	9.9215240	834	9.8194096	2748	10.1805904	35
26	9.7411251	1912	9.9214406	834	9.8196844	2748	10.1803156	34
27	9.7413164	1911	9.9213572	835	9.8199592	2746	10.1800408	33
28	9.7415075	1911	9.9212737	835	9.8202338	2746	10.1797662	32
29	9.7416985	1909	9.9211902	836	9.8205084	2745	10.1794916	31
30	9.7418895	—	9.9211066	—	9.8207829	—	10.1792171	30
—	—	—	—	—	—	—	—	—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 56

Sinus			G. 33		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
30	9.7418895		9.9211066		9.8207829		10.1792171
		1908		837		2745	
31	9.7420803		9.9210229	836	9.8210574		10.1789426
32	9.7422710	1907	9.9209393	838	9.8213217	2743	10.1786683
33	9.7424516	1906	9.9208555	838	9.8216060	2743	10.1783940
34	9.7426520	1904	9.9207717	839	9.8218803	2743	10.1781197
35	9.7428423	1903	9.9206878	839	9.8221545	2742	10.1778455
36	9.7430325	1902	9.9206039	839	9.8224286	2741	10.1775714
37	9.7432226	1901	9.9205200	839	9.8227026	2740	10.1772974
38	9.7434126	1900	9.9204360	840	9.8229766	2740	10.1770234
39	9.7436024	1898	9.9203519	841	9.8232505	2739	10.1767495
40	9.7437921	1897	9.9202678	841	9.8235244	2739	10.1764756
		1896		842		2737	
41	9.7439817	1895	9.9201836	842	9.8237981	2738	10.1762019
42	9.7441712	1894	9.9200994	843	9.8240719	2736	10.1759281
43	9.7443606	1892	9.9200151	843	9.8243455	2736	10.1756545
44	9.7445498	1892	9.9199308	844	9.8246191	2735	10.1753809
45	9.7447390	1890	9.9198464	845	9.8248926	2734	10.1751074
46	9.7449280	1889	9.9197619	845	9.8251660	2734	10.1748340
47	9.7451169	1887	9.9196775	846	9.8254394	2733	10.1745606
48	9.7453056	1887	9.9195929	846	9.8257127	2733	10.1742872
49	9.7454942	1885	9.9195082	846	9.8259860	2732	10.1740140
50	9.7456828		9.9194237	846	9.8262592	2732	10.1737408
		1884		847		2731	
51	9.7458712	1883	9.9193390	848	9.8265323	2730	10.1734677
52	9.7460595	1882	9.9192542	848	9.8268053	2730	10.1731947
53	9.7462477	1881	9.9191694	849	9.8270783	2730	10.1729217
54	9.7464358	1879	9.9190845	849	9.8273513	2728	10.1726487
55	9.7466237	1878	9.9189996	850	9.8276241	2728	10.1723759
56	9.7468115	1877	9.9189146	850	9.8278969	2727	10.1721031
57	9.7469992	1876	9.9188296	851	9.8281696	2727	10.1718304
58	9.7471868	1875	9.9187445	851	9.8284423	2726	10.1715577
59	9.7473743	1874	9.9186594	852	9.8287149	2725	10.1712851
60	9.7475617		9.9185742		9.8289874		10.1710126
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 56

G. 56

A a

SINUS

G. 34

TANGENTES

M	L. Sin.	Diff	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.7475617		9.9185742		9.8289874		10.1710126	60
		1872		852		2725		
1	9.7477489		9.9184890		9.8292599		10.1707401	59
2	9.7479360	1871	9.9184037	853	9.8295323	2724	10.1704677	58
3	9.7481230	1870	9.9183183	854	9.8298047	2724	10.1701953	57
4	9.7483099	1869	9.9182329	854	9.8300769	2722	10.1699231	56
5	9.7484967	1868	9.9181475	854	9.8303492	2722	10.1696508	55
6	9.7486833	1865	9.9180621	855	9.8306213	2721	10.1693787	54
7	9.7488698	1865	9.9179764	856	9.8308934	2721	10.1691066	53
8	9.7490562	1864	9.9178908	856	9.8311654	2720	10.1688346	52
9	9.7492425	1863	9.9178051	857	9.8314374	2720	10.1685626	51
10	9.7494287	1862	9.9177194	857	9.8317093	2719	10.1682907	50
		1861		858		2718		
11	9.7496148	1859	9.9176336	858	9.8319811	2718	10.1680189	49
12	9.7498007	1859	9.9175478	859	9.8322529	2717	10.1677471	48
13	9.7499866	1857	9.9174619	859	9.8325246	2716	10.1674754	47
14	9.7501723	1856	9.9173760	860	9.8327963	2715	10.1672037	46
15	9.7503579	1855	9.9172900	860	9.8330679	2715	10.1669321	45
16	9.7505434	1853	9.9172040	861	9.8333394	2714	10.1666606	44
17	9.7507287	1853	9.9171179	862	9.8336109	2713	10.1663891	43
18	9.7509140	1851	9.9170317	862	9.8338823	2713	10.1661177	42
19	9.7510991	1851	9.9169455	862	9.8341536	2713	10.1658464	41
20	9.7512842		9.9168593		9.8344249		10.1655751	40
		1849		863		2712		
21	9.7514691	1847	9.9167730	864	9.8346961	2712	10.1653039	39
22	9.7516538	1847	9.9166866	864	9.8349673	2711	10.1650327	38
23	9.7518385	1846	9.9166002	865	9.8352384	2710	10.1647616	37
24	9.7520231	1844	9.9165137	865	9.8355094	2710	10.1644906	36
25	9.7522075	1844	9.9164272	866	9.8357804	2709	10.1642196	35
26	9.7523919	1842	9.9163406	867	9.8360513	2708	10.1639487	34
27	9.7525761	1841	9.9162539	866	9.8363221	2708	10.1636779	33
28	9.7527602	1840	9.9161673	868	9.8365929	2707	10.1634071	32
29	9.7529442	1838	9.9160805	868	9.8368636	2707	10.1631364	31
30	9.7531280		9.9159937		9.8371343		10.1628657	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus

G. 34

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.7531280		9.9159937		9.8371343		10.1628657	30
		1838		868		2706		
31	9.7532118		9.9159069		9.8374049		10.1625951	29
		1836		869		2706		
32	9.7534954		9.9158200		9.8376755		10.1623245	28
		1835		870		2705		
33	9.7536790		9.9157330		9.8379460		10.1620540	27
		1834		870		2704		
34	9.7538624		9.9156460		9.8382164		10.1617836	26
		1833		871		2703		
35	9.7540457		9.9155589		9.8384867		10.1615132	25
		1831		871		2704		
36	9.7542288		9.9154718		9.8387571		10.1612429	24
		1831		872		2702		
37	9.7544119		9.9153846		9.8390273		10.1609727	23
		1830		872		2702		
38	9.7545949		9.9152974		9.8392975		10.1607025	22
		1828		872		2701		
39	9.7547777		9.9152101		9.8395676		10.1604324	21
		1827		873		2701		
40	9.7549604		9.9151228		9.8398377		10.1601623	20
		1827		874		2700		
41	9.7551431		9.9150354		9.8401077		10.1598922	19
		1825		875		2699		
42	9.7553256		9.9149479		9.8403776		10.1596224	18
		1824		875		2699		
43	9.7555080		9.9148604		9.8406475		10.1593525	17
		1822		875		2699		
44	9.7556902		9.9147729		9.8409174		10.1590826	16
		1822		877		2697		
45	9.7558724		9.9146852		9.8411871		10.1588129	15
		1820		876		2698		
46	9.7560544		9.9145976		9.8414569		10.1585431	14
		1820		877		2696		
47	9.7562364		9.9145099		9.8417265		10.1582735	13
		1818		878		2696		
48	9.7564182		9.9144221		9.8419961		10.1580039	12
		1817		879		2695		
49	9.7565999		9.9143342		9.8422657		10.1577343	11
		1816		878		2694		
50	9.7567815		9.9142464		9.8425351		10.1574649	10
		1815		880		2695		
51	9.7569620		9.9141584		9.8428046		10.1571954	9
		1814		880		2693		
52	9.7571444		9.9140704		9.8430739		10.1569261	8
		1812		880		2693		
53	9.7573256		9.9139824		9.8433432		10.1566568	7
		1812		881		2693		
54	9.7575068		9.9138943		9.8436125		10.1563875	6
		1810		882		2692		
55	9.7576878		9.9138061		9.8438817		10.1561182	5
		1809		882		2691		
56	9.7578687		9.9137179		9.8441508		10.1558492	4
		1808		883		2691		
57	9.7580495		9.9136296		9.8444199		10.1555801	3
		1807		883		2690		
58	9.7582302		9.9135413		9.8446889		10.1553111	2
		1806		882		2690		
59	9.7584108		9.9134530		9.8449579		10.1550421	1
		1805		885		2689		
60	9.7585913		9.9133645		9.8452268		10.1547732	0
		1805						
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

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A 2 2

Sinus			G. 35		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.7585913		9.9133645		9.8452268		10.1547732	60
		1804		885		2688		
1	9.7587717	1801	9.9132760	885	9.8454956	2688	10.1545044	59
2	9.7589519	1802	9.9131875	886	9.8457644	2688	10.1542356	58
3	9.7591321	1800	9.9130989	887	9.8460332	2686	10.1539668	57
4	9.7593121	1799	9.9130102	887	9.8463018	2687	10.1536982	56
5	9.7594920	1798	9.9129215	887	9.8465705	2685	10.1534295	55
6	9.7596718	1797	9.9128328	888	9.8468390	2685	10.1531610	54
7	9.7598515	1796	9.9127440	889	9.8471075	2685	10.1528925	53
8	9.7600311	1795	9.9126551	889	9.8473760	2684	10.1526240	52
9	9.7602106	1793	9.9125662	890	9.8476444	2683	10.1523556	51
10	9.7603899	1793	9.9124772	890	9.8479127	2683	10.1520873	50
		1793		890		2683		
11	9.7605692	1791	9.9123882	891	9.8481810	2682	10.1518190	49
12	9.7607483	1791	9.9122991	892	9.8484492	2682	10.1515508	48
13	9.7609274	1789	9.9122099	892	9.8487174	2681	10.1512826	47
14	9.7611063	1788	9.9121207	892	9.8489855	2681	10.1510145	46
15	9.7612851	1787	9.9120315	893	9.8492536	2680	10.1507463	45
16	9.7614638	1786	9.9119422	894	9.8495216	2680	10.1504782	44
17	9.7616424	1784	9.9118528	894	9.8497896	2680	10.1502104	43
18	9.7618208	1684	9.9117634	895	9.8500575	2677	10.1499424	42
19	9.7619992	1783	9.9116739	895	9.8503253	2678	10.1496747	41
20	9.7621775	1781	9.9115844	896	9.8505931	2677	10.1494069	40
		1781		896		2677		
21	9.7623556	1781	9.9114948	897	9.8508608	2677	10.1491392	39
22	9.7625337	1779	9.9114051	896	9.8511285	2676	10.1488715	38
23	9.7627116	1778	9.9113155	898	9.8513961	2676	10.1486039	37
24	9.7628894	1777	9.9112257	898	9.8516637	2675	10.1483363	36
25	9.7630671	1777	9.9111359	899	9.8519312	2675	10.1480688	35
26	9.7632447	1776	9.9110460	899	9.8521987	2674	10.1478013	34
27	9.7634222	1775	9.9109561	900	9.8524661	2674	10.1475339	33
28	9.7635996	1774	9.9108661	901	9.8527335	2673	10.1472665	32
29	9.7637769	1773	9.9107761	901	9.8530008	2672	10.1469992	31
30	9.7639540	1771	9.9106860		9.8532680		10.1467320	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 54

Sinus

G. 35

Tangentes

M	L. Sin.	Diff.	L. Cos.	D	L. Tan.	D.co.	L. Cot.	
30	9.7639540		9.9126860		9.85321680		10.1467320	30
		1771		901		1672		
31	9.7641311		9.9105959		9.8535252		10.1464648	29
32	9.7643080	1769	9.9105057	902	9.8538022	2671	10.1461977	28
33	9.7644849	1769	9.9104155	902	9.8540694	2671	10.1459306	27
34	9.7646616	1767	9.9103251	904	9.8543365	2671	10.1456635	26
35	9.7648382	1766	9.9102348	903	9.8546034	2669	10.1453966	25
36	9.7650147	1765	9.9101444	904	9.8548704	2670	10.1451296	24
37	9.7651911	1764	9.9100539	905	9.8551372	2668	10.1448628	23
38	9.7653674	1763	9.9099634	905	9.8554041	2669	10.1445959	22
39	9.7655436	1762	9.9098728	906	9.8556708	2667	10.1443292	21
40	9.7657197	1761	9.9097821	907	9.8559376	2668	10.1440624	20
		1760		906		2666		
41	9.7658957	1758	9.9096915	908	9.8562042	2666	10.1437958	19
42	9.7660715	1758	9.9096007	908	9.8564708	2666	10.1435292	18
43	9.7662473	1756	9.9095099	909	9.8567374	2665	10.1432626	17
44	9.7664229	1756	9.9094190	909	9.8570039	2665	10.1429961	16
45	9.7665985	1754	9.9093281	910	9.8572704	2664	10.1427296	15
46	9.7667739	1752	9.9092371	910	9.8575368	2664	10.1424632	14
47	9.7669492	1752	9.9091461	910	9.8578031	2663	10.1421969	13
48	9.7671244	1752	9.9090550	911	9.8580694	2663	10.1419306	12
49	9.7672996	1750	9.9089639	911	9.8583357	2662	10.1416643	11
50	9.7674746		9.9088727	912	9.8586019		10.1413981	10
		1748		913		2661		
51	9.7676494	1748	9.9087814	913	9.8588680	2661	10.1411320	9
52	9.7678242	1747	9.9086901	913	9.8591341	2661	10.1408659	8
53	9.7679989	1746	9.9085988	915	9.8594002	2659	10.1405998	7
54	9.7681735	1745	9.9085073	914	9.8596661	2660	10.1403339	6
55	9.7683480	1743	9.9084159	916	9.8599321	2659	10.1400679	5
56	9.7685222	1743	9.9083242	916	9.8601980	2658	10.1398020	4
57	9.7686966	1741	9.9082327	916	9.8604638	2658	10.1395362	3
58	9.7688707	1741	9.9081411	917	9.8607296	2658	10.1392704	2
59	9.7690448		9.9080494	918	9.8609954	2656	10.1390046	1
60	9.7692187	1739	9.9079576		9.8612610		10.1387390	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 54

Sines			G. 36		Tangents			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. Co.	L. Cot.	
0	9.7692187		9.9079576		9.8612610		10.1387399	60
—		1738		918		2657		—
1	9.7693925		9.9078658		9.8615267		10.1384733	59
2	9.7695662	1737	9.9077740	918	9.8617923	2656	10.1382077	58
3	9.7697398	1736	9.9076822	920	9.8620578	2655	10.1379422	57
4	9.7699134	1736	9.9075901	919	9.8623233	2655	10.1376767	56
5	9.7700868	1734	9.9074980	921	9.8625888	2654	10.1374112	55
6	9.7702601	1733	9.9074059	921	9.8628541	2654	10.1371459	54
7	9.7704332	1731	9.9073138	921	9.8631195	2654	10.1368805	53
8	9.7706063	1731	9.9072216	922	9.8633848	2653	10.1366152	52
9	9.7707793	1730	9.9071292	923	9.8636500	2652	10.1363500	51
10	9.7709522	1729	9.9070370	923	9.8639152	2652	10.1360848	50
—		1727		924		2651		—
11	9.7711249		9.9069446		9.8641807		10.1358197	49
12	9.7712976	1727	9.9068522	924	9.8644454	2651	10.1355547	48
13	9.7714702	1726	9.9067597	925	9.8647105	2650	10.1352895	47
14	9.7716426	1724	9.9066671	926	9.8649755	2649	10.1350245	46
15	9.7718150	1724	9.9065745	926	9.8652404	2649	10.1347596	45
16	9.7719872	1722	9.9064819	926	9.8655052	2649	10.1344947	44
17	9.7721593	1721	9.9063892	927	9.8657702	2648	10.1342298	43
18	9.7723314	1721	9.9062964	928	9.8660350	2647	10.1339650	42
19	9.7725033	1719	9.9062036	928	9.8663007	2647	10.1337003	41
20	9.7726751	1718	9.9061107	929	9.8665644	2647	10.1334356	40
—		1717		930		2647		—
21	9.7728468		9.9060177		9.8668291		10.1331709	39
22	9.7730185	1717	9.9059247	930	9.8670937	2646	10.1329062	38
23	9.7731900	1715	9.9058317	931	9.8673582	2645	10.1326417	37
24	9.7733614	1714	9.9057386	932	9.8676228	2645	10.1323772	36
25	9.7735327	1713	9.9056454	932	9.8678873	2644	10.1321127	35
26	9.7737039	1712	9.9055522	932	9.8681517	2643	10.1318482	34
27	9.7738749	1710	9.9054589	933	9.8684160	2644	10.1315840	33
28	9.7740459	1710	9.9053656	933	9.8686804	2642	10.1313196	32
29	9.7742168	1709	9.9052722	934	9.8689446	2643	10.1310554	31
30	9.7743876	1708	9.9051787	935	9.8692089		10.1307911	30
—								—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 53

Sinus

G. 36

Tangentes

M	L. Sin.	Diff.	L. Cof.	D.	L. Tan.	D.co.	L. Cor.	
30	9.7743876		9.9051785		9.8692089		10.1307911	30
		1707		933		2642		
31	9.7745582		9.9050822		9.8694721		10.1305169	29
32	9.7747188	1705	9.9049916	936	9.8697172	2641	10.1302628	28
33	9.7748993	1705	9.9049050	936	9.8700013	2641	10.1299987	27
34	9.7750697	1704	9.9048042	937	9.8702653	2640	10.1297347	26
35	9.7752399	1702	9.9047106	937	9.8705293	2640	10.1294707	25
36	9.7754101	1702	9.9046168	938	9.8707923	2640	10.1292067	24
37	9.7755801	1700	9.9045230	938	9.8710572	2639	10.1289428	23
38	9.7757501	1700	9.9044291	939	9.8713210	2638	10.1286790	22
39	9.7759199	1698	9.9043351	940	9.8715848	2638	10.1284152	21
40	9.7760897	1698	9.9042411	940	9.8718486	2638	10.1281514	20
		1696		941		2637		
41	9.7762592	1696	9.9041470	941	9.8721123	2637	10.1278877	19
42	9.7764289	1694	9.9040529	942	9.8723760	2636	10.1276240	18
43	9.7765983	1693	9.9039587	942	9.8726396	2636	10.1273604	17
44	9.7767676	1693	9.9038644	943	9.8729022	2636	10.1270968	16
45	9.7769369	1691	9.9037701	944	9.8731668	2634	10.1268332	15
46	9.7771060	1690	9.9036757	944	9.8734302	2635	10.1265698	14
47	9.7772750	1689	9.9035812	945	9.8736937	2634	10.1263063	13
48	9.7774439	1689	9.9034868	945	9.8739571	2633	10.1260429	12
49	9.7776128	1687	9.9033923	946	9.8742204	2634	10.1257796	11
50	9.7777815	1686	9.9032977	946	9.8744838	2632	10.1255162	10
		1685		947		2632		
51	9.7779501	1685	9.9032031	947	9.8747470	2632	10.1252530	9
52	9.7781186	1684	9.9031084	948	9.8750102	2632	10.1249898	8
53	9.7782870	1683	9.9030136	948	9.8752734	2631	10.1247266	7
54	9.7784553	1682	9.9029188	949	9.8755365	2631	10.1244635	6
55	9.7786235	1681	9.9028239	950	9.8757996	2631	10.1242004	5
56	9.7787916	1681	9.9027289	950	9.8760627	2630	10.1239373	4
57	9.7789596	1679	9.9026339	950	9.8763257	2629	10.1236743	3
58	9.7791275	1678	9.9025389	951	9.8765886	2629	10.1234114	2
59	9.7792952	1677	9.9024438	952	9.8768515	2629	10.1231485	1
60	9.7794630		9.9023486		9.8771144		10.1228856	0
	L. Cof.		L. Sin.		L. Cor.		L. Tan.	M

G. 53

Sinus			G. 37		Tangentes			
M	L. Sin.	Diff	L. Cof.	D.	L. Tan.	D.co.	L. Cot.	
0	9.7794630		9.9023486		9.8771144		10.1228856	60
		1676		952		2628		
1	9.7796306		9.9022524		9.8773772		10.1226228	59
2	9.7797981	1675	9.9021581	953	9.8776400	2628	10.1223600	58
3	9.7799655	1674	9.9020628	953	9.8779027	2627	10.1220973	57
4	9.7801328	1673	9.9019674	954	9.8781654	2627	10.1218346	56
5	9.7803000	1672	9.9018719	955	9.8784281	2627	10.1215719	55
6	9.7804671	1671	9.9017764	955	9.8786907	2626	10.1213093	54
7	9.7806341	1670	9.9016808	956	9.8789533	2626	10.1210467	53
8	9.7808010	1669	9.9015852	956	9.8792158	2625	10.1207842	52
9	9.7809677	1667	9.9014895	957	9.8794782	2624	10.1205218	51
10	9.7811344	1667	9.9013938	957	9.8797407	2625	10.1202593	50
		1666		958		2624		
11	9.7813010	1665	9.9012980		9.8800031	2623	10.1199969	49
12	9.7814675	1664	9.9012021	959	9.8802654	2623	10.1197346	48
13	9.7816339	1663	9.9011062	959	9.8805277	2623	10.1194723	47
14	9.7818002	1662	9.9010102	960	9.8807900	2622	10.1192100	46
15	9.7819664	1662	9.9009142	960	9.8810522	2622	10.1189478	45
16	9.7821324	1660	9.9008181	961	9.8813144	2621	10.1186856	44
17	9.7822984	1660	9.9007219	961	9.8815765	2621	10.1184235	43
18	9.7824643	1659	9.9006257	962	9.8818386	2621	10.1181614	42
19	9.7826301	1658	9.9005294	963	9.8821007	2620	10.1178993	41
20	9.7827958	1657	9.9004331	963	9.8823627	2620	10.1176373	40
		1656		964		2619		
21	9.7829614	1654	9.9003367	964	9.8826246	2620	10.1173754	39
22	9.7831268	1654	9.9002407	965	9.8828866	2618	10.1171134	38
23	9.7832922	1653	9.9001438	966	9.8831484	2619	10.1168516	37
24	9.7834575	1652	9.9000472	966	9.8834103	2618	10.1165897	36
25	9.7836227	1651	9.8999506	967	9.8836721	2617	10.1163279	35
26	9.7837878	1650	9.8998539	967	9.8839338	2618	10.1160662	34
27	9.7839528	1649	9.8997572	968	9.8841956	2616	10.1158044	33
28	9.7841177	1647	9.8996604	968	9.8844572	2617	10.1155428	32
29	9.7842824	1647	9.8995636	969	9.8847189	2616	10.1152811	31
30	9.7844471		9.8994667		9.8849805		10.1150195	30
	L. Cof.		L. Sin.		L. Cot.		L. Tan.	M

G. 52

Sinus

G. 37

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.7844471		9.8994567		9.8849805		10.1150195	30
		1646		970		2615		
31	9.7846117		9.8993697		9.8852420		10.1147580	29
32	9.7847762	1645	9.8992727	970	9.8855035	2615	10.1144965	28
33	9.7849406	1644	9.8991756	971	9.8857650	2615	10.1142350	27
34	9.7851049	1643	9.8990784	972	9.8860264	2614	10.1139736	26
35	9.7852691	1642	9.8989812	972	9.8862878	2614	10.1137122	25
36	9.7854332	1641	9.8988840	972	9.8865492	2614	10.1134508	24
37	9.7855972	1640	9.8987867	973	9.8868105	2613	10.1131895	23
38	9.7857611	1639	9.8986893	974	9.8870718	2613	10.1129282	22
39	9.7859249	1638	9.8985919	974	9.8873330	2612	10.1126670	21
40	9.7860886	1637	9.8984944	975	9.8875942	2612	10.1124058	20
		1636		976		2612		
41	9.7862522	1635	9.8983968		9.8878554		10.1121446	19
42	9.7864157	1634	9.8982992	976	9.8881165	2611	10.1118835	18
43	9.7865791	1633	9.8982015	977	9.8883775	2610	10.1116225	17
44	9.7867424	1632	9.8981038	977	9.8886386	2611	10.1113614	16
45	9.7869056	1631	9.8980060	978	9.8888996	2610	10.1111003	15
46	9.7870687	1630	9.8979082	978	9.8891605	2609	10.1108395	14
47	9.7872317	1629	9.8978103	979	9.8894214	2609	10.1105786	13
48	9.7873946	1628	9.8977123	980	9.8896823	2609	10.1103177	12
49	9.7875574	1628	9.8976143	981	9.8899432	2608	10.1100568	11
50	9.7877202		9.8975162		9.8902040		10.1097960	10
		1626		981		2607		
51	9.7878828	1625	9.8974181	982	9.8904647	2607	10.1095353	9
52	9.7880453	1624	9.8973199	983	9.8907254	2607	10.1092746	8
53	9.7882077	1624	9.8972216	983	9.8909861	2607	10.1090139	7
54	9.7883701	1622	9.8971233	984	9.8912468	2606	10.1087532	6
55	9.7885323	1621	9.8970249	984	9.8915074	2605	10.1084926	5
56	9.7886944	1621	9.8969265	985	9.8917679	2606	10.1082321	4
57	9.7888565	1619	9.8968280	986	9.8920285	2605	10.1079715	3
58	9.7890184	1618	9.8967294	986	9.8922890	2604	10.1077110	2
59	9.7891802	1618	9.8966308	987	9.8925494	2604	10.1074506	1
60	9.7893420		9.8965321		9.8928098		10.1071902	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 52

B b

Sines			G. 38		Tangents			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.7893420		9.8965221		9.8928098		10.1071902	60
		1616		87		2604		
1	9.7895026	1616	9.8964334	988	9.8927070	2604	10.1069298	59
2	9.7896632	1614	9.8963346	988	9.8926036	2601	10.1066694	58
3	9.7898236	1614	9.8962358	989	9.8925009	2601	10.1064091	57
4	9.7899840	1612	9.8961369	990	9.8923981	2603	10.1061489	56
5	9.7901443	1611	9.8960379	990	9.8922954	2601	10.1058886	55
6	9.7903047	1611	9.8959389	991	9.8921927	2602	10.1056285	54
7	9.7904651	1610	9.8958398	992	9.8920900	2601	10.1053683	53
8	9.7906255	1608	9.8957406	992	9.8919873	2601	10.1051082	52
9	9.7907859	1608	9.8956414	992	9.8918846	2600	10.1048481	51
10	9.7909463	1607	9.8955422	992	9.8917819	2600	10.1045881	50
		1607		993				
11	9.7911068	1606	9.8954429	994	9.8916792	2600	10.1043281	49
12	9.7912672	1605	9.8953437	995	9.8915765	2599	10.1040681	48
13	9.7914276	1604	9.8952440	995	9.8914738	2599	10.1038082	47
14	9.7915880	1603	9.8951445	995	9.8913711	2599	10.1035483	46
15	9.7917484	1602	9.8950450	997	9.8912684	2598	10.1032884	45
16	9.7919088	1601	9.8949453	996	9.8911657	2598	10.1030286	44
17	9.7920692	1600	9.8948457	998	9.8910630	2598	10.1027688	43
18	9.7922296	1599	9.8947459	998	9.8909603	2597	10.1025090	42
19	9.7923900	1598	9.8946461	998	9.8908576	2597	10.1022493	41
20	9.7925504	1597	9.8945463	1000	9.8907549	2596	10.1019896	40
		1597						
21	9.7927108	1597	9.8944463	999	9.8906522	2596	10.1017298	39
22	9.7928712	1595	9.8943464	1001	9.8905495	2596	10.1014704	38
23	9.7930316	1594	9.8942463	1001	9.8904468	2595	10.1012108	37
24	9.7931920	1594	9.8941462	1001	9.8903441	2595	10.1009513	36
25	9.7933524	1592	9.8940461	1002	9.8902414	2595	10.1006918	35
26	9.7935128	1592	9.8939458	1002	9.8901387	2594	10.1004323	34
27	9.7936732	1590	9.8938456	1004	9.8900360	2594	10.1001729	33
28	9.7938336	1590	9.8937452	1004	9.8899333	2594	10.0999135	32
29	9.7939940	1589	9.8936448	1004	9.8898306	2593	10.0996541	31
30	9.7941544		9.8935444		9.8897279		10.0993948	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 5

Sinus		C. 38		Tangentes				
M	L. Sin.		L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.7941496		9.8935444		9.9006052		10.0993948	20
		1587		1005		2593		
31	9.7942083		9.8934339		9.9008645		10.0991355	29
32	9.7942670	1587	9.8933232	1006	9.9011237	2592	10.0988762	28
33	9.7943256	1586	9.8932126	1007	9.9013830	2593	10.0986170	27
34	9.7943841	1585	9.8931019	1007	9.9016422	2592	10.0983578	26
35	9.7944425	1584	9.8929912	1007	9.9019013	2591	10.0980987	25
36	9.7945008	1582	9.8928804	1008	9.9021604	2591	10.0978396	24
37	9.7945590	1582	9.8927695	1009	9.9024195	2591	10.0975805	23
38	9.7946171	1581	9.8926585	1010	9.9026786	2591	10.0973214	22
39	9.7946751	1580	9.8925475	1010	9.9029376	2590	10.0970622	21
40	9.7947330	1579	9.8924365	1010	9.9031966	2590	10.0968032	20
		1579		1011		2589		
41	9.7947909		9.8923254	1012	9.9034555	2589	10.0965445	19
42	9.7948486	1577	9.8922142	1013	9.9037144	2589	10.0962856	18
43	9.7949062	1576	9.8921030	1013	9.9039733	2588	10.0960267	17
44	9.7949638	1576	9.8919916	1013	9.9042321	2589	10.0957679	16
45	9.7950212	1574	9.8918803	1014	9.9044910	2587	10.0955090	15
46	9.7950786	1574	9.8917689	1015	9.9047497	2588	10.0952502	14
47	9.7951359	1573	9.8916574	1016	9.9050085	2587	10.0949915	13
48	9.7951930	1571	9.8915458	1016	9.9052672	2587	10.0947328	12
49	9.7952501	1571	9.8914342	1016	9.9055259	2586	10.0944741	11
50	9.7953071	1570	9.8913226	1016	9.9057845	2586	10.0942155	10
		1569		1018		2586		
51	9.7953640		9.8912108	1017	9.9060431	2586	10.0939569	9
52	9.7954208	1568	9.8910991	1019	9.9063017	2586	10.0936983	8
53	9.7954775	1567	9.8911172	1019	9.9065602	2585	10.0934397	7
54	9.7955341	1566	9.8911153	1020	9.9068188	2585	10.0931812	6
55	9.7955906	1565	9.8910133	1020	9.9070773	2584	10.0929227	5
56	9.7956470	1564	9.8909113	1021	9.9073357	2584	10.0926642	4
57	9.7957034	1564	9.8908092	1021	9.9075941	2584	10.0924059	3
58	9.7957596	1562	9.8907071	1022	9.9078525	2584	10.0921475	2
59	9.7958158	1562	9.8906049	1023	9.9081109	2583	10.0918891	1
60	9.7958718	1560	9.8905026		9.9083692		10.0916308	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

C. 51

C. 51

B b 2

Sinus			G 39		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
0	9.7988718		9.8905016		9.9083619		10.0916308
		1560		1023		2583	
1	9.7990278		9.8904002		9.9084275		10.0913725
2	9.7991826	1558	9.8902979	1024	9.9084838	2583	10.0911142
3	9.7993394	1558	9.8901954	1025	9.9091440	2582	10.0908500
4	9.7994951	1557	9.8900929	1025	9.9093022	2582	10.0905978
5	9.7996507	1556	9.8899903	1026	9.9096603	2581	10.0903397
6	9.7998062	1555	9.8898877	1026	9.9099185	2582	10.0900815
7	9.7999616	1554	9.8897850	1027	9.9101766	2581	10.0898234
8	9.8001169	1553	9.8896822	1028	9.9104347	2581	10.0895653
9	9.8002721	1552	9.8895794	1028	9.9106927	2580	10.0893073
10	9.8004272	1551	9.8894765	1029	9.9109507	2580	10.0890493
		1551		1029		2580	
11	9.8005823		9.8893736		9.9112087		10.0887913
12	9.8007372	1549	9.8892706	1030	9.9114666	2579	10.0885334
13	9.8008921	1549	9.8891675	1031	9.9117245	2579	10.0882755
14	9.8010468	1547	9.8890644	1032	9.9119824	2579	10.0880176
15	9.8012015	1547	9.8889612	1032	9.9122403	2578	10.0877597
16	9.8013561	1546	9.8888580	1032	9.9124981	2578	10.0875019
17	9.8015106	1545	9.8887547	1033	9.9127559	2578	10.0872441
18	9.8016649	1543	9.8886513	1034	9.9130137	2578	10.0869862
19	9.8018192	1543	9.8885479	1034	9.9132714	2577	10.0867286
20	9.8019735	1543	9.8884444	1035	9.9135291	2577	10.0864709
		1541		1036		2577	
21	9.8021276		9.8883408		9.9137868		10.0862132
22	9.8022816	1540	9.8882372	1036	9.9140444	2576	10.0859556
23	9.8024355	1539	9.8881335	1037	9.9143020	2576	10.0856980
24	9.8025893	1539	9.8880298	1037	9.9145596	2576	10.0854404
25	9.8027431	1537	9.8879260	1038	9.9148171	2575	10.0851829
26	9.8028968	1537	9.8878221	1039	9.9150747	2575	10.0849252
27	9.8030504	1536	9.8877182	1039	9.9153322	2575	10.0846678
28	9.8032038	1534	9.8876142	1040	9.9155896	2574	10.0844104
29	9.8033572	1534	9.8875102	1040	9.9158471	2575	10.0841529
30	9.8035105	1533	9.8874061	1041	9.9161045	2574	10.0838955
	L. Cos.		L. Sin.		L. Cot.		L. Tan.
							M

Sinus		G. 39		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.
30	9.8035105		9.8874061		9.9161045		10.0838955
		1532		1042		2573	
31	9.8026637		9.8873019		9.9162618		10.0836282
32	9.8038168	1531	9.8871977	1042	9.9166192	2574	10.0833808
33	9.8039699	1531	9.8870934	1043	9.9168765	2573	10.0831225
34	9.8041228	1529	9.8869890	1044	9.9171338	2573	10.0828662
35	9.8042757	1528	9.8868846	1044	9.9173911	2573	10.0826089
36	9.8044284	1527	9.8867801	1045	9.9176483	2572	10.0823517
37	9.8045811	1527	9.8866756	1045	9.9179055	2572	10.0820945
38	9.8047336	1525	9.8865710	1045	9.9181627	2572	10.0818273
39	9.8048861	1525	9.8864663	1047	9.9184198	2571	10.0815802
40	9.8050385	1524	9.8863616	1047	9.9186769	2571	10.0813231
		1523		1048		2571	
41	9.8051908	1522	9.8862568		9.9189340		10.0810660
42	9.8053430	1521	9.8861519	1049	9.9191911	2571	10.0808089
43	9.8054951	1521	9.8860470	1049	9.9194481	2570	10.0805519
44	9.8056472	1519	9.8859420	1050	9.9197051	2570	10.0802949
45	9.8057991	1519	9.8858370	1050	9.9199621	2570	10.0800379
46	9.8059510	1517	9.8857319	1051	9.9202191	2570	10.0797809
47	9.8061027	1517	9.8856267	1052	9.9204760	2569	10.0795240
48	9.8062544	1516	9.8855215	1052	9.9207329	2569	10.0792671
49	9.8064060	1515	9.8854162	1053	9.9209898	2569	10.0790102
50	9.8065575		9.8853109	1053	9.9212466	2568	10.0787534
		1514		1054		2568	
51	9.8067089	1513	9.8852055		9.9215034		10.0784966
52	9.8068602	1512	9.8851000	1055	9.9217602	2568	10.0782398
53	9.8070114	1512	9.8849945	1055	9.9220170	2568	10.0779830
54	9.8071626	1510	9.8848889	1056	9.9222737	2567	10.0777262
55	9.8073136	1510	9.8847832	1057	9.9225304	2567	10.0774696
56	9.8074646	1508	9.8846775	1057	9.9227871	2567	10.0772129
57	9.8076154	1508	9.8845717	1058	9.9230437	2566	10.0769563
58	9.8077662	1507	9.8844659	1058	9.9233004	2567	10.0766996
59	9.8079169	1506	9.8843599	1060	9.9235570	2566	10.0764430
60	9.8080675		9.8842540	1060	9.9238135	2565	10.0761865
	L. Cos.		L. Sin.		L. Cot.		L. Tan.

G. 50

Sinus		Gr. 40		T. n. entes				
M	L. Sm.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.8080675		9.8842540		9.9238135		10.0761865	60
		1505		1061		2566		
1	9.8082180		9.8841479		9.9240701		10.0759209	59
2	9.8083684	1504	9.8840418	1061	9.9243266	2565	10.0756724	58
3	9.8085188	1504	9.8839357	1061	9.9245831	2565	10.0754169	57
4	9.8086690	1502	9.8838294	1063	9.9248396	2565	10.0751604	56
5	9.8088192	1502	9.8837232	1062	9.9250960	2564	10.0749030	55
6	9.8089692	1500	9.8836168	1064	9.9253524	2564	10.0746476	54
7	9.8091192	1500	9.8835104	1064	9.9256088	2564	10.0743912	53
8	9.8092691	1499	9.8834039	1065	9.9258652	2564	10.0741348	52
9	9.8094189	1498	9.8832974	1065	9.9261215	2563	10.0738785	51
10	9.8095686	1497	9.8831908	1066	9.9263778	2563	10.0736222	50
		1496		1067		2563		
11	9.8097182	1496	9.8830841	1067	9.9266341	2563	10.0733659	49
12	9.8098678	1494	9.8829774	1068	9.9268904	2562	10.0731096	48
13	9.8100172	1494	9.8828706	1068	9.9271466	2562	10.0728534	47
14	9.8101666	1493	9.8827638	1070	9.9274028	2562	10.0725972	46
15	9.8103159	1491	9.8826568	1069	9.9276592	2562	10.0723410	45
16	9.8104650	1491	9.8825499	1071	9.9279152	2561	10.0720845	44
17	9.8106141	1490	9.8824428	1071	9.9281713	2561	10.0718287	43
18	9.8107631	1490	9.8823357	1072	9.9284274	2561	10.0715726	42
19	9.8109121	1488	9.8822285	1072	9.9286835	2561	10.0713165	41
20	9.8110609		9.8821213		9.9289396		10.0710604	40
		1487		1073		2560		
21	9.8112096	1487	9.8820140	1073	9.9291956	2560	10.0708044	39
22	9.8113582	1486	9.8819067	1075	9.9294516	2560	10.0705484	38
23	9.8115069	1485	9.8817992	1074	9.9297076	2560	10.0702924	37
24	9.8116554	1484	9.8816918	1076	9.9299636	2559	10.0700364	36
25	9.8118038	1483	9.8815842	1076	9.9302195	2560	10.0697805	35
26	9.8119521	1482	9.8814766	1077	9.9304755	2557	10.0695245	34
27	9.8121003	1481	9.8813689	1077	9.9307314	2558	10.0692686	33
28	9.8122484	1481	9.8812612	1078	9.9309872	2559	10.0690128	32
29	9.8123965	1479	9.8811534	1079	9.9312431	2558	10.0687569	31
30	9.8125444		9.8810455		9.9314989		10.0685011	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Gr. 49

Sinus

G. 40

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.8125444		9.8810455		9.9314989		10.0685011	30
		1479		1079		2558		
31	9.8126922	1478	9.8809376	1080	9.9317547		10.0682453	29
32	9.8128401	1477	9.8808296	1081	9.9320105	2558	10.0679895	28
33	9.8129878	1476	9.8807215	1082	9.9322662	2557	10.0677338	27
34	9.8131354	1475	9.8806134	1083	9.9325220	2558	10.0674780	26
35	9.8132829	1474	9.8805052	1084	9.9327777	2557	10.0672223	25
36	9.8134303	1473	9.8803970	1085	9.9330334	2557	10.0669666	24
37	9.8135777	1472	9.8802887	1086	9.9332890	2556	10.0667110	23
38	9.8137250	1471	9.8801803	1087	9.9335446	2556	10.0664554	22
39	9.8138721	1470	9.8800719	1088	9.9338003	2557	10.0661997	21
40	9.8140192		9.8799634	1089	9.9340559	2556	10.0659441	20
		1470		1086		2555		
41	9.8141662	1469	9.8798548	1086	9.9343114	2556	10.0656886	19
42	9.8143131	1469	9.8797462	1087	9.9345670	2556	10.0654330	18
43	9.8144600	1467	9.8796375	1088	9.9348225	2555	10.0651775	17
44	9.8146067	1467	9.8795287	1088	9.9350780	2555	10.0649220	16
45	9.8147534	1465	9.8794199	1089	9.9353335	2555	10.0646665	15
46	9.8148999	1465	9.8793110	1089	9.9355889	2554	10.0644111	14
47	9.8150463	1464	9.8792021	1091	9.9358444	2555	10.0641556	13
48	9.8151928	1463	9.8790930	1090	9.9360998	2554	10.0639002	12
49	9.8153391	1463	9.8789840	1092	9.9363552	2554	10.0636448	11
50	9.8154854		9.8788748	1092	9.9366105	2553	10.0633895	10
		1461		1092		2554		
51	9.8156315	1461	9.8787656	1093	9.9368659	2553	10.0631341	9
52	9.8157776	1459	9.8786563	1093	9.9371212	2553	10.0628788	8
53	9.8159235	1459	9.8785470	1094	9.9373765	2553	10.0626235	7
54	9.8160694	1458	9.8784376	1095	9.9376318	2553	10.0623682	6
55	9.8162152	1457	9.8783281	1095	9.9378871	2552	10.0621129	5
56	9.8163609	1457	9.8782186	1096	9.9381422	2552	10.0618577	4
57	9.8165066	1455	9.8781090	1096	9.9383975	2552	10.0616025	3
58	9.8166521	1454	9.8779994	1098	9.9386527	2552	10.0613473	2
59	9.8167975	1454	9.8778896	1097	9.9389079	2552	10.0610921	1
60	9.8169429		9.8777799		9.9391631	2552	10.0608369	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. 41		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.8169429		9.8777799		9.9391631		10.0608369	60
		1453		1099		1551		
1	9.8170882		9.8776700		9.9394182		10.0605818	59
		1452		1099		1551		
2	9.8172334		9.8775601		9.9396733		10.0603267	58
		1451		1100		1551		
3	9.8173785		9.8774501		9.9399284		10.0600716	57
		1450		1100		1551		
4	9.8175235		9.8773401		9.9401835		10.0598165	56
		1450		1101		1550		
5	9.8176685		9.8772300		9.9404386		10.0595615	55
		1448		1102		1551		
6	9.8178132		9.8771198		9.9406936		10.0593064	54
		1448		1102		1550		
7	9.8179581		9.8770056		9.9409486		10.0590514	53
		1447		1103		1550		
8	9.8181028		9.8768993		9.9412036		10.0587964	52
		1446		1104		1549		
9	9.8182474		9.8767889		9.9414585		10.0585415	51
		1445		1104		1550		
10	9.8183919		9.8766785		9.9417135		10.0582865	50
		1445		1105		1549		
11	9.8185364		9.8765680		9.9419684		10.0580316	49
		1443		1106		1549		
12	9.8186807		9.8764574		9.9422233		10.0577767	48
		1443		1106		1549		
13	9.8188250		9.8763468		9.9424782		10.0575218	47
		1442		1107		1549		
14	9.8189692		9.8762361		9.9427331		10.0572669	46
		1441		1108		1548		
15	9.8191123		9.8761253		9.9429879		10.0570121	45
		1440		1108		1549		
16	9.8192573		9.8760145		9.9432428		10.0567572	44
		1439		1109		1548		
17	9.8194012		9.8759036		9.9434976		10.0565024	43
		1438		1109		1548		
18	9.8195450		9.8757927		9.9437524		10.0562476	42
		1438		1111		1548		
19	9.8196888		9.8756816		9.9440072		10.0559928	41
		1437		1110		1547		
20	9.8198325		9.8755706		9.9442619		10.0557381	40
		1436		1112		1547		
21	9.8199761		9.8754594		9.9445166		10.0554834	39
		1435		1112		1548		
22	9.8201196		9.8753482		9.9447714		10.0552286	38
		1434		1113		1547		
23	9.8202630		9.8752369		9.9450261		10.0549739	37
		1433		1113		1546		
24	9.8204062		9.8751256		9.9452807		10.0547192	36
		1433		1114		1547		
25	9.8205496		9.8750142		9.9455354		10.0544646	35
		1431		1115		1546		
26	9.8206927		9.8749027		9.9457900		10.0542100	34
		1421		1115		1547		
27	9.8208358		9.8747912		9.9460447		10.0539553	33
		1420		1117		1546		
28	9.8209788		9.8746795		9.9462992		10.0537007	32
		1429		1116		1546		
29	9.8211217		9.8745679		9.9465539		10.0534461	31
		1429		1118		1545		
30	9.8212646		9.8744561		9.9468084		10.0531916	30
	L. Cos.		L. Sin.		L. Cot		L. Tan.	M

41. 48

Sinus

G. 41

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. ro.	L. Cot.	
30	9.8212546		9.8744561		9.9468084		10.0531916	30
—	—	1427	—	1118	—	2545	—	—
31	9.8214073		9.8743443		9.9470630		10.0529370	29
32	9.8215500	1427	9.8742325	1118	9.9473175	2545	10.0526825	28
33	9.8216926	1426	9.8741205	1120	9.9475720	2545	10.0524280	27
34	9.8218351	1425	9.8740085	1120	9.9478265	2545	10.0521735	26
35	9.8219775	1424	9.8738965	1120	9.9480810	2545	10.0519190	25
36	9.8221198	1423	9.8737844	1121	9.9483355	2545	10.0516645	24
37	9.8222621	1423	9.8736722	1122	9.9485899	2544	10.0514101	23
38	9.8224042	1421	9.8735599	1123	9.9488443	2544	10.0511557	22
39	9.8225463	1421	9.8734476	1123	9.9490987	2544	10.0509013	21
40	9.8226883	1420	9.8733352	1124	9.9493531	2544	10.0506469	20
—	—	1419	—	1125	—	2544	—	—
41	9.8228302	1419	9.8732227	1125	9.9496075	2544	10.0503925	19
42	9.8229721	1417	9.8731102	1126	9.9498619	2543	10.0501381	18
43	9.8231138	1417	9.8729976	1127	9.9501162	2543	10.0498838	17
44	9.8232555	1416	9.8728849	1127	9.9503705	2543	10.0496295	16
45	9.8233971	1415	9.8727722	1128	9.9506248	2543	10.0493752	15
46	9.8235386	1414	9.8726594	1128	9.9508791	2543	10.0491209	14
47	9.8236800	1413	9.8725466	1129	9.9511334	2543	10.0488666	13
48	9.8238213	1413	9.8724337	1130	9.9513876	2542	10.0486124	12
49	9.8239626	1411	9.8723207	1131	9.9516419	2542	10.0483581	11
50	9.8241037	1411	9.8722076	1131	9.9518961	2542	10.0481039	10
—	—	1411	—	1131	—	2542	—	—
51	9.8242448	1410	9.8720945	1132	9.9521503	2542	10.0478497	9
52	9.8243858	1409	9.8719813	1132	9.9524045	2542	10.0475955	8
53	9.8245267	1409	9.8718681	1133	9.9526587	2541	10.0473413	7
54	9.8246676	1407	9.8717548	1134	9.9529128	2542	10.0470872	6
55	9.8248083	1407	9.8716414	1135	9.9531670	2541	10.0468330	5
56	9.8249490	1406	9.8715279	1135	9.9534211	2541	10.0465789	4
57	9.8250896	1405	9.8714144	1136	9.9536752	2541	10.0463248	3
58	9.8252301	1404	9.8713008	1136	9.9539293	2541	10.0460707	2
59	9.8253705	1404	9.8711872	1137	9.9541834	2540	10.0458166	1
60	9.8255109	1404	9.8710735	1137	9.9544374	2540	10.0455626	0
—	—	—	—	—	—	—	—	—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 48

Sinus.

G. 42

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9 8255109	1403	9 8710725	1138	9 9544374	2541	10 0455626	60
1	9 8255512		9 8709597		9 9545915		10 0453085	59
2	9 8257912	1401	9 8708458	1139	9 9549455	2540	10 0450545	58
3	9 8259214	1401	9 8707219	1139	9 9551995	2540	10 0448005	57
4	9 8260715	1401	9 8706179	1140	9 9554535	2540	10 0445465	56
5	9 8262114	1298	9 8705039	1140	9 9557075	2540	10 0442925	55
6	9 8263512	1398	9 8703898	1141	9 9559615	2540	10 0440385	54
7	9 8264910	1398	9 8702756	1142	9 9562154	2539	10 0437846	53
8	9 8266307	1297	9 8701613	1143	9 9564694	2539	10 0435306	52
9	9 8267703	1296	9 8700470	1143	9 9567233	2539	10 0432767	51
10	9 8269095	1395	9 8699326	1144	9 9569772	2539	10 0430228	50
11	9 8270492	1395	9 8698183	1144	9 9572311	2539	10 0427689	49
12	9 8271887	1394	9 8697037	1145	9 9574850	2539	10 0425150	48
13	9 8273279	1292	9 8695891	1145	9 9577389	2538	10 0422611	47
14	9 8274671	1392	9 8694744	1147	9 9579927	2538	10 0420072	46
15	9 8276063	1392	9 8693597	1147	9 9582465	2538	10 0417533	45
16	9 8277453	1290	9 8692449	1148	9 9585004	2538	10 0414996	44
17	9 8278843	1390	9 8691201	1148	9 9587542	2538	10 0412458	43
18	9 8280231	1288	9 8690052	1149	9 9590080	2538	10 0409920	42
19	9 8281619	1388	9 8688902	1150	9 9592618	2537	10 0407382	41
20	9 8283006	1387	9 8687751	1151	9 9595155	2537	10 0404845	40
21	9 8284392	1285	9 8686600	1151	9 9597693	2537	10 0402307	39
22	9 8285778	1385	9 8685448	1152	9 9600230	2537	10 0399770	38
23	9 8287163	1284	9 8684296	1152	9 9602767	2538	10 0397233	37
24	9 8288547	1384	9 8683142	1154	9 9605305	2537	10 0394695	36
25	9 8289930	1282	9 8682088	1154	9 9607842	2536	10 0392158	35
26	9 8291312	1382	9 8680934	1155	9 9610378	2537	10 0389622	34
27	9 8292694	1281	9 8679779	1156	9 9612915	2537	10 0387085	33
28	9 8294075	1379	9 8678623	1157	9 9615452	2536	10 0384548	32
29	9 8295454	1279	9 8677466	1157	9 9617988	2537	10 0382012	31
30	9 8296833	1379	9 8676309	1157	9 9620525	2537	10 0379475	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 47

Sinus			G. 42		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cor.	
30	9.8296833		9.8676209		9.9620525		10.0379475	30
		1379		1158		2536		
31	9.8298212		9.8675151		9.9622061		10.0376939	29
32	9.8299589	1377	9.8673992	1159	9.9623597	2536	10.0374403	28
33	9.8300966	1377	9.8672833	1159	9.9625133	2536	10.0371867	27
34	9.8302342	1376	9.8671673	1160	9.9626669	2536	10.0369331	26
35	9.8303717	1375	9.8670512	1161	9.9628204	2535	10.0366796	25
36	9.8305091	1374	9.8669351	1161	9.9629740	2536	10.0364260	24
37	9.8306464	1373	9.8668189	1162	9.9631275	2535	10.0361725	23
38	9.8307837	1373	9.8667026	1163	9.9632811	2536	10.0359189	22
39	9.8309209	1372	9.8665863	1163	9.9634346	2535	10.0356654	21
40	9.8310580	1371	9.8664699	1164	9.9635881	2535	10.0354119	20
		1370		1165		2535		
41	9.8311950		9.8663534	1165	9.9637416	2535	10.0351584	19
42	9.8313220	1370	9.8662369	1166	9.9638951	2535	10.0349049	18
43	9.8314688	1368	9.8661203	1167	9.9640486	2534	10.0346514	17
44	9.8316056	1367	9.8660036	1168	9.9642021	2535	10.0343980	16
45	9.8317423	1366	9.8658868	1168	9.9643555	2534	10.0341445	15
46	9.8318789	1366	9.8657700	1169	9.9645089	2534	10.0338911	14
47	9.8320155	1364	9.8656531	1169	9.9646623	2534	10.0336377	13
48	9.8321519	1364	9.8655362	1170	9.9648157	2535	10.0333843	12
49	9.8322883	1363	9.8654192	1171	9.9649692	2533	10.0331308	11
50	9.8324246		9.8653021		9.9651225		10.0328775	10
		1363		1172		2534		
51	9.8325609		9.8651849		9.9652759		10.0326241	9
52	9.8326970	1361	9.8650677	1172	9.9654292	2534	10.0323707	8
53	9.8328331	1361	9.8649504	1173	9.9655827	2534	10.0321173	7
54	9.8329691	1360	9.8648331	1173	9.9657360	2533	10.0318640	6
55	9.8331050	1359	9.8647156	1175	9.9658893	2533	10.0316107	5
56	9.8332408	1358	9.8645981	1175	9.9660427	2534	10.0313573	4
57	9.8333766	1358	9.8644806	1177	9.9661960	2533	10.0311040	3
58	9.8335122	1356	9.8643629	1177	9.9663493	2533	10.0308507	2
59	9.8336478	1356	9.8642452	1177	9.9665026	2533	10.0305974	1
60	9.8337833	1355	9.8641275		9.9666559		10.0303441	0
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	L. Cos.		L. Sin.		L. Cor.		L. Tan.	M

G. 47

G. 47

C c 2

Sinus			G. 43		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
0	9.8337833		9.8641275		9.9696559		10.0303441	60
		1355		1179		2532		
1	9.8339188		9.8640096		9.9699091		10.0300909	59
2	9.8340541	1353	9.8638917	1179	9.9701624	2533	10.0298376	58
3	9.8341894	1353	9.8637737	1180	9.9704157	2533	10.0295843	57
4	9.8343246	1352	9.8636557	1180	9.9706689	2532	10.0293311	56
5	9.8344597	1351	9.8635376	1181	9.9709221	2532	10.0290779	55
6	9.8345948	1351	9.8634194	1182	9.9711754	2533	10.0288246	54
7	9.8347297	1349	9.8633011	1183	9.9714286	2532	10.0285714	53
8	9.8348646	1349	9.8631828	1182	9.9716818	2532	10.0283182	52
9	9.8349994	1348	9.8630644	1184	9.9719350	2532	10.0280650	51
10	9.8351341	1347	9.8629460	1184	9.9721882	2532	10.0278118	50
		1347		1186		2531		
11	9.8352688		9.8628274		9.9724413		10.0275587	49
2	9.8354033	1345	9.8627088	1186	9.9726945	2532	10.0273055	48
3	9.8355378	1345	9.8625902	1186	9.9729477	2532	10.0270523	47
4	9.8356722	1344	9.8624714	1188	9.9732008	2531	10.0267992	46
5	9.8358066	1344	9.8623526	1188	9.9734539	2531	10.0265461	45
6	9.8359408	1342	9.8622338	1190	9.9737071	2531	10.0262929	44
7	9.8360750	1342	9.8621148	1190	9.9739602	2531	10.0260398	43
8	9.8362091	1341	9.8619958	1191	9.9742133	2531	10.0257867	42
9	9.8363431	1340	9.8618767	1191	9.9744664	2531	10.0255336	41
0	9.8364771	1340	9.8617576	1191	9.9747195	2531	10.0252805	40
		1338		1193		2531		
21	9.8366109		9.8616383		9.9749726		10.0250274	39
22	9.8367447	1338	9.8615190	1193	9.9752257	2531	10.0247743	38
23	9.8368784	1337	9.8613997	1193	9.9754787	2531	10.0245213	37
24	9.8370121	1337	9.8612802	1194	9.9757318	2531	10.0242682	36
25	9.8371456	1335	9.8611608	1195	9.9759849	2531	10.0240151	35
26	9.8372791	1335	9.8610412	1196	9.9762379	2530	10.0237621	34
27	9.8374125	1334	9.8609215	1197	9.9764909	2530	10.0235091	33
28	9.8375458	1333	9.8608018	1197	9.9767440	2530	10.0232560	32
29	9.8376790	1332	9.8606821	1197	9.9769970	2530	10.0230030	31
30	9.8378122	1332	9.8605622	1199	9.9772500	2530	10.0227500	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. 43		Tangentes		
M	L. Sin.	Diff.	L. Cosf.	D.	L. Tan.	D.co.	L. Cot.
30	9.8378122		9.8605622		9.9772500		10.0217500
		1331		1199		2530	
31	9.8379453		9.8604422		9.9775030		10.0214970
32	9.8380783	1330	9.8603223	1200	9.9777560	2530	10.0212440
33	9.8382112	1329	9.8602022	1201	9.9780090	2530	10.0219910
34	9.8383441	1329	9.8600821	1201	9.9782620	2530	10.0217380
35	9.8384769	1328	9.8599619	1202	9.9785149	2529	10.0214851
36	9.8386096	1327	9.8598416	1203	9.9787679	2530	10.0212321
37	9.8387422	1326	9.8597213	1203	9.9790209	2530	10.0209791
38	9.8388747	1325	9.8596009	1204	9.9792738	2529	10.0207262
39	9.8390072	1325	9.8594804	1205	9.9795268	2530	10.0204732
40	9.8391396	1324	9.8593599	1205	9.9797797	2529	10.0202203
		1323		1206		2529	
41	9.8392719	1322	9.8592393	1207	9.9800326	2530	10.0199674
42	9.8394041	1322	9.8591186	1207	9.9802856	2530	10.0197144
43	9.8395363	1321	9.8589978	1208	9.9805385	2529	10.0194615
44	9.8396684	1321	9.8588770	1208	9.9807914	2529	10.0192086
45	9.8398004	1320	9.8587561	1209	9.9810443	2529	10.0189557
46	9.8399323	1319	9.8586351	1210	9.9812972	2529	10.0187028
47	9.8400642	1319	9.8585141	1210	9.9815501	2529	10.0184499
48	9.8401959	1317	9.8583929	1212	9.9818030	2529	10.0181970
49	9.8403276	1317	9.8582718	1211	9.9820559	2529	10.0179441
50	9.8404593	1317	9.8581505	1213	9.9823087	2528	10.0176913
		1315		1213		2529	
51	9.8405908	1315	9.8580292	1214	9.9825616	2529	10.0174384
52	9.8407223	1314	9.8579078	1215	9.9828145	2528	10.0171855
53	9.8408537	1313	9.8577862	1216	9.9830673	2529	10.0169327
54	9.8409850	1312	9.8576648	1216	9.9833202	2528	10.0166798
55	9.8411162	1312	9.8575432	1217	9.9835730	2529	10.0164270
56	9.8412474	1311	9.8574215	1217	9.9838259	2528	10.0161741
57	9.8413785	1310	9.8572998	1219	9.9840787	2528	10.0159212
58	9.8415095	1309	9.8571779	1218	9.9843315	2529	10.0156685
59	9.8416404	1309	9.8570561	1220	9.9845844	2528	10.0154156
60	9.8417713		9.8579341		9.9848372		10.0151628
	L. Cosf.		L. Sin.		L. Cot.		L. Tan.

G. 46

G. 46

SINUS

G. 44

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.8417713		9.8569341		9.9848372		10.0151628	60
		1308		1220		2528	----	—
1	9.8419021		9.8568121		9.9850900		10.0149100	59
2	9.8420328	1307	9.8566900	1221	9.9852428	2528	10.0146572	58
3	9.8421634	1306	9.8565678	1222	9.9855956	2528	10.0144044	57
4	9.8422939	1305	9.8564455	1223	9.9858484	2528	10.0141516	56
5	9.8424244	1305	9.8563232	1223	9.9861012	2528	10.0138988	55
6	9.8425548	1304	9.8562008	1224	9.9863540	2528	10.0136460	54
7	9.8426851	1303	9.8560784	1224	9.9866068	2528	10.0133932	53
8	9.8428154	1303	9.8559558	1226	9.9868596	2528	10.0131404	52
9	9.8429456	1302	9.8558332	1226	9.9871123	2527	10.0128877	51
10	9.8430757	1301	9.8557106	1226	9.9873651	2528	10.0126349	50
		1300		1228		2528	----	—
11	9.8432057	1299	9.8555878	1228	9.9876179	2527	10.0123821	49
12	9.8433356	1299	9.8554650	1229	9.9878706	2528	10.0121294	48
13	9.8434655	1298	9.8553421	1229	9.9881234	2527	10.0118766	47
14	9.8435953	1297	9.8552192	1231	9.9883761	2528	10.0116239	46
15	9.8437250	1297	9.8550961	1231	9.9886289	2527	10.0113711	45
16	9.8438547	1295	9.8549730	1231	9.9888816	2528	10.0111184	44
17	9.8439842	1295	9.8548499	1231	9.9891344	2527	10.0108656	43
18	9.8441137	1295	9.8547266	1233	9.9893871	2528	10.0106129	42
19	9.8442432	1293	9.8546033	1233	9.9896399	2528	10.0103601	41
20	9.8443725	1293	9.8544799	1234	9.9898926	2527	10.0101074	40
		1293		1235		2527	----	—
21	9.8445018	1292	9.8543564	1235	9.9901453	2528	10.0098547	39
22	9.8446310	1291	9.8542329	1236	9.9903981	2527	10.0096019	38
23	9.8447601	1290	9.8541093	1237	9.9906508	2527	10.0093492	37
24	9.8448891	1290	9.8539856	1237	9.9909035	2527	10.0090965	36
25	9.8450181	1289	9.8538619	1237	9.9911562	2527	10.0088438	35
26	9.8451470	1288	9.8537381	1239	9.9914089	2527	10.0085911	34
27	9.8452758	1287	9.8536142	1240	9.9916616	2527	10.0083384	33
28	9.8454045	1287	9.8534902	1240	9.9919143	2527	10.0080857	32
29	9.8455332	1286	9.8533662	1241	9.9921670	2527	10.0078330	31
30	9.8456618		9.8532421		9.9924197		10.0075803	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 45

Sinus

G. 44

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.8456618		9.8532421		9.9924197		10.0075803	30
		1385		1242		2527		
31	9.8457903		9.8531179		9.9926724		10.0073276	29
32	9.8459188	1385	9.8529936	1243	9.9929251	2527	10.0070749	28
33	9.8460471	1383	9.8528693	1243	9.9931778	2527	10.0068222	27
34	9.8461754	1383	9.8527449	1244	9.9934305	2527	10.0065695	26
35	9.8463036	1381	9.8526204	1245	9.9936832	2537	10.0063168	25
36	9.8464318	1382	9.8524959	1245	9.9939359	2527	10.0060641	24
37	9.8465599	1381	9.8523713	1246	9.9941886	2527	10.0058114	23
38	9.8466879	1380	9.8522466	1247	9.9944413	2527	10.0055587	22
39	9.8468158	1379	9.8521218	1248	9.9946940	2527	10.0053060	21
40	9.8469436	1378	9.8519970	1248	9.9949466	2526	10.0050534	20
		1378		1249		2527		
41	9.8470714	1377	9.8518721	1250	9.9951993	2527	10.0048007	19
42	9.8471991	1376	9.8517471	1251	9.9954520	2527	10.0045480	18
43	9.8473267	1376	9.8516220	1251	9.9957047	2527	10.0042953	17
44	9.8474543	1374	9.8514969	1252	9.9959573	2527	10.0040427	16
45	9.8475817	1374	9.8513717	1252	9.9962100	2527	10.0037900	15
46	9.8477091	1374	9.8512465	1254	9.9964627	2527	10.0035373	14
47	9.8478365	1372	9.8511211	1254	9.9967154	2526	10.0032846	13
48	9.8479637	1372	9.8509957	1255	9.9969680	2527	10.0030320	12
49	9.8480909	1371	9.8508702	1256	9.9972207	2527	10.0027793	11
50	9.8482180	1371	9.8507446	1256	9.9974734	2527	10.0025266	10
		1370		1256		2526		
51	9.8483450	1370	9.8506190	1257	9.9977260	2527	10.0022740	9
2	9.8484720	1369	9.8504933	1258	9.9979787	2527	10.0020213	8
3	9.8485989	1368	9.8503675	1258	9.9982314	2526	10.0017686	7
4	9.8487257	1367	9.8502417	1260	9.9984840	2527	10.0015160	6
5	9.8488524	1367	9.8501157	1260	9.9987367	2526	10.0012633	5
6	9.8489791	1366	9.8499897	1260	9.9989893	2527	10.0010107	4
7	9.8491057	1365	9.8498637	1262	9.9992420	2527	10.0007580	3
8	9.8492321	1364	9.8497375	1262	9.9994947	2526	10.0005053	2
9	9.8493586	1364	9.8496113	1263	9.9997473	2527	10.0002527	1
10	9.8494850		9.8494850		10.0000000		10.0000000	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	At

G. 45

Sinus			Gr. 40		T. n. entes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.8080675		9.8842540		9.9238135		10.0761865	60
		1505		1061		2566		
1	9.8082180		9.8841479		9.9240701		10.0759209	59
2	9.8083684	1504	9.8840418	1061	9.9243266	2565	10.0756724	58
3	9.8085188	1504	9.8839357	1061	9.9245831	2565	10.0754169	57
4	9.8086690	1502	9.8838294	1062	9.9248396	2565	10.0751604	56
5	9.8088191	1502	9.8837232	1062	9.9250960	2564	10.0749030	55
6	9.8089692	1500	9.8836168	1064	9.9253524	2564	10.0746476	54
7	9.8091192	1500	9.8835104	1064	9.9256088	2564	10.0743912	53
8	9.8092691	1499	9.8834039	1065	9.9258652	2564	10.0741348	52
9	9.8094189	1498	9.8832974	1065	9.9261215	2563	10.0738785	51
10	9.8095686	1497	9.8831908	1066	9.9263778	2563	10.0736222	50
		1496		1067		2563		
11	9.8097182	1496	9.8830841	1067	9.9266341	2563	10.0733659	49
12	9.8098678	1494	9.8829774	1068	9.9268904	2562	10.0731096	48
13	9.8100172	1494	9.8828706	1068	9.9271466	2562	10.0728534	47
14	9.8101666	1493	9.8827638	1070	9.9274028	2562	10.0725972	46
15	9.8103159	1491	9.8826568	1069	9.9276599	2562	10.0723410	45
16	9.8104650	1491	9.8825499	1071	9.9279152	2561	10.0720845	44
17	9.8106141	1490	9.8824428	1071	9.9281713	2561	10.0718287	43
18	9.8107631	1490	9.8823357	1072	9.9284274	2561	10.0715726	42
19	9.8109121	1488	9.8822285	1072	9.9286835	2561	10.0713165	41
20	9.8110609	1487	9.8821213	1073	9.9289396	2560	10.0710604	40
		1487		1073		2560		
21	9.8112096	1487	9.8820140	1073	9.9291956	2560	10.0708044	39
22	9.8113583	1486	9.8819067	1075	9.9294516	2560	10.0705484	38
23	9.8115069	1485	9.8817992	1074	9.9297076	2560	10.0702924	37
24	9.8116554	1484	9.8816918	1076	9.9299636	2559	10.0700364	36
25	9.8118038	1483	9.8815842	1076	9.9302195	2559	10.0697805	35
26	9.8119521	1482	9.8814766	1077	9.9304755	2557	10.0695245	34
27	9.8121003	1481	9.8813689	1077	9.9307314	2558	10.0692686	33
28	9.8122484	1481	9.8812612	1078	9.9309872	2559	10.0690128	32
29	9.8123965	1479	9.8811534	1079	9.9312431	2558	10.0687569	31
30	9.8125444		9.8810455		9.9314989		10.0685011	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Gr. 49

Gr. 49

Sines

G. 40

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.8125444		9.8810455		9.9314989		10.0685011	30
		1479		1079		2558		
31	9.8126923		9.8809376		9.9317547		10.0682453	29
32	9.8128401	1478	9.8808296	1080	9.9320105	2558	10.0679895	28
33	9.8129878	1477	9.8807215	1081	9.9322662	2557	10.0677338	27
34	9.8131354	1476	9.8806134	1081	9.9325220	2558	10.0674780	26
35	9.8132829	1475	9.8805052	1082	9.9327777	2557	10.0672223	25
36	9.8134303	1474	9.8803970	1082	9.9330334	2557	10.0669666	24
37	9.8135777	1473	9.8802887	1083	9.9332890	2556	10.0667110	23
38	9.8137250	1473	9.8801803	1084	9.9335446	2556	10.0664554	22
39	9.8138721	1471	9.8800719	1084	9.9338003	2557	10.0661997	21
40	9.8140192	1471	9.8799634	1085	9.9340559	2556	10.0659441	20
		1470		1086		2555		
41	9.8141662	1469	9.8798548	1086	9.9343114	2556	10.0656886	19
42	9.8143131	1469	9.8797462	1087	9.9345670	2555	10.0654330	18
43	9.8144600	1467	9.8796375	1088	9.9348225	2555	10.0651775	17
44	9.8146067	1467	9.8795287	1088	9.9350780	2555	10.0649220	16
45	9.8147534	1465	9.8794199	1089	9.9353335	2554	10.0646665	15
46	9.8148999	1465	9.8793110	1089	9.9355889	2554	10.0644111	14
47	9.8150462	1464	9.8792021	1091	9.9358444	2553	10.0641556	13
48	9.8151928	1463	9.8790930	1090	9.9360998	2554	10.0639002	12
49	9.8153391	1463	9.8789840	1092	9.9363552	2553	10.0636448	11
50	9.8154854		9.8788745	1092	9.9366105	2553	10.0633895	10
		1461		1091		2554		
51	9.8156315	1461	9.8787656	1093	9.9368659	2553	10.0631341	9
52	9.8157776	1459	9.8786563	1093	9.9371212	2553	10.0628788	8
53	9.8159235	1459	9.8785470	1094	9.9373765	2553	10.0626235	7
54	9.8160694	1458	9.8784376	1095	9.9376318	2553	10.0623682	6
55	9.8162152	1457	9.8783281	1095	9.9378871	2552	10.0621129	5
56	9.8163609	1457	9.8782186	1096	9.9381422	2552	10.0618577	4
57	9.8165066	1455	9.8781090	1096	9.9383975	2552	10.0616025	3
58	9.8166521	1454	9.8779994	1098	9.9386527	2552	10.0613473	2
59	9.8167975	1454	9.8778896	1097	9.9389079	2552	10.0610921	1
60	9.8169429		9.8777799		9.9391631	2552	10.0608369	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. 41		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.8169429		9.8777799		9.9391631		10.0608369	60
		1453		1099		2551		
1	9.8170882		9.8776700		9.9394182		10.0605818	59
		1452		1099		2551		
2	9.8172334		9.8775601		9.9396733		10.0603267	58
		1451		1100		2551		
3	9.8173785		9.8774501		9.9399284		10.0600716	57
		1450		1100		2551		
4	9.8175235		9.8773401		9.9401835		10.0598165	56
		1450		1101		2550		
5	9.8176685		9.8772300		9.9404386		10.0595615	55
		1448		1102		2551		
6	9.8178132		9.8771198		9.9406936		10.0593064	54
		1448		1102		2550		
7	9.8179581		9.8770096		9.9409486		10.0590514	53
		1447		1103		2550		
8	9.8181028		9.8768993		9.9412036		10.0587964	52
		1446		1104		2549		
9	9.8182474		9.8767889		9.9414585		10.0585415	51
		1445		1104		2550		
10	9.8183919		9.8766785		9.9417135		10.0582865	50
		1445		1105		2549		
11	9.8185364		9.8765680		9.9419684		10.0580316	49
		1443		1106		2549		
12	9.8186807		9.8764574		9.9422233		10.0577767	48
		1442		1106		2549		
13	9.8188250		9.8763468		9.9424782		10.0575218	47
		1441		1107		2549		
14	9.8189692		9.8762361		9.9427331		10.0572669	46
		1441		1108		2548		
15	9.8191133		9.8761253		9.9429879		10.0570121	45
		1440		1108		2549		
16	9.8192573		9.8760145		9.9432428		10.0567572	44
		1439		1109		2548		
17	9.8194012		9.8759036		9.9434976		10.0565024	43
		1438		1109		2548		
18	9.8195450		9.8757927		9.9437524		10.0562476	42
		1438		1111		2548		
19	9.8196888		9.8756816		9.9440072		10.0559928	41
		1437		1110		2547		
20	9.8198325		9.8755706		9.9442619		10.0557381	40
		1436		1112		2547		
21	9.8199761		9.8754594		9.9445166		10.0554834	39
		1435		1112		2548		
22	9.8201196		9.8753482		9.9447714		10.0552286	38
		1434		1113		2547		
23	9.8202630		9.8752369		9.9450261		10.0549739	37
		1433		1113		2546		
24	9.8204062		9.8751256		9.9452807		10.0547192	36
		1433		1114		2547		
25	9.8205496		9.8750142		9.9455354		10.0544646	35
		1431		1115		2546		
26	9.8206927		9.8749027		9.9457900		10.0542100	34
		1421		1115		2547		
27	9.8208358		9.8747912		9.9460447		10.0539553	33
		1420		1117		2546		
28	9.8209788		9.8746795		9.9462992		10.0537007	32
		1429		1116		2546		
29	9.8211217		9.8745679		9.9465539		10.0534461	31
		1429		1118		2545		
30	9.8212646		9.8744561		9.9468084		10.0531916	30
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 48

Sinus

G. 41

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.8212546		9.8744561		9.9468084		10.0531916	30
		1427		1118		2545		
31	9.8214073		9.8743443		9.9470630		10.0529370	29
32	9.8215500	1427	9.8742325	1118	9.9473175	2545	10.0526825	28
33	9.8216926	1426	9.8741205	1120	9.9475720	2545	10.0524280	27
34	9.8218351	1425	9.8740085	1120	9.9478265	2545	10.0521735	26
35	9.8219775	1424	9.8738965	1120	9.9480810	2545	10.0519190	25
36	9.8221198	1423	9.8737844	1121	9.9483355	2545	10.0516645	24
37	9.8222621	1423	9.8736722	1122	9.9485899	2544	10.0514101	23
38	9.8224042	1421	9.8735599	1123	9.9488443	2544	10.0511557	22
39	9.8225463	1421	9.8734476	1123	9.9490987	2544	10.0509013	21
40	9.8226883	1420	9.8733352	1124	9.9493531	2544	10.0506469	20
		1419		1125		2544		
41	9.8228302		9.8732227		9.9496075		10.0503925	19
42	9.8229721	1419	9.8731102	1125	9.9498619	2544	10.0501381	18
43	9.8231138	1417	9.8730076	1126	9.9501162	2543	10.0498838	17
44	9.8232555	1417	9.8728849	1127	9.9503705	2543	10.0496295	16
45	9.8233971	1416	9.8727722	1127	9.9506248	2543	10.0493752	15
46	9.8235386	1415	9.8726594	1128	9.9508791	2543	10.0491209	14
47	9.8236800	1414	9.8725466	1128	9.9511334	2543	10.0488666	13
48	9.8238213	1413	9.8724337	1129	9.9513876	2542	10.0486124	12
49	9.8239628	1413	9.8723207	1130	9.9516419	2542	10.0483581	11
50	9.8241037	1411	9.8722076	1131	9.9518961	2542	10.0481039	10
		1411		1131		2542		
51	9.8242448		9.8720945		9.9521503		10.0478497	9
52	9.8243858	1410	9.8719813	1132	9.9524045	2542	10.0475955	8
53	9.8245267	1409	9.8718681	1132	9.9526587	2542	10.0473413	7
54	9.8246676	1409	9.8717548	1133	9.9529128	2541	10.0470872	6
55	9.8248083	1407	9.8716414	1134	9.9531670	2542	10.0468330	5
56	9.8249490	1407	9.8715279	1135	9.9534211	2541	10.0465789	4
57	9.8250896	1406	9.8714144	1135	9.9536752	2541	10.0463248	3
58	9.8252301	1405	9.8713008	1136	9.9539293	2541	10.0460707	2
59	9.8253705	1404	9.8711872	1136	9.9541834	2541	10.0458166	1
60	9.8255109	1404	9.8710735	1137	9.9544374	2540	10.0455626	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 48

C c

G. 42							
SINUS.			TANGENTES				
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. Co.	L. Cot.
0	9.8255109		9.8710735		9.9544374		10.0455626
1		1403		1138		2541	
2	9.8255612		9.8709597		9.9545915		10.0453085
3	9.8257913	1401	9.8708358	1139	9.9549455	2540	10.0450545
4	9.8259214	1401	9.8707219	1139	9.9551995	2540	10.0448005
5	9.8260715	1401	9.8706179	1140	9.9554535	2540	10.0445465
6	9.8262114	1399	9.8705039	1140	9.9557075	2540	10.0442925
7	9.8263512	1398	9.8703898	1141	9.9559615	2540	10.0440385
8	9.8264910	1398	9.8702756	1141	9.9562154	2539	10.0437846
9	9.8266307	1397	9.8701613	1142	9.9564694	2540	10.0435306
10	9.8267703	1396	9.8700470	1142	9.9567233	2539	10.0432767
11	9.8269095	1395	9.8699326	1144	9.9569772	2539	10.0430228
12		1395		1144		2539	
13	9.8270492		9.8698182		9.9572311		10.0427689
14	9.8271887	1394	9.8697037	1145	9.9574850	2539	10.0425150
15	9.8273279	1392	9.8695891	1146	9.9577389	2538	10.0422611
16	9.8274671	1392	9.8694744	1147	9.9579927	2538	10.0420072
17	9.8276063	1392	9.8693597	1147	9.9582465	2538	10.0417533
18	9.8277453	1390	9.8692449	1148	9.9585003	2538	10.0414996
19	9.8278843	1390	9.8691301	1148	9.9587542	2538	10.0412458
20	9.8280231	1388	9.8690152	1149	9.9590080	2538	10.0409920
21	9.8281619	1388	9.8689002	1150	9.9592618	2537	10.0407382
22	9.8283006	1387	9.8687851	1151	9.9595155	2537	10.0404845
23		1387		1151		2538	
24	9.8284392		9.8686700		9.9597693		10.0402307
25	9.8285778	1385	9.8685548	1152	9.9600230	2537	10.0399770
26	9.8287163	1385	9.8684396	1152	9.9602767	2537	10.0397233
27	9.8288547	1384	9.8683242	1154	9.9605305	2537	10.0394695
28	9.8289930	1382	9.8682088	1154	9.9607842	2536	10.0392158
29	9.8291312	1382	9.8680934	1155	9.9610378	2537	10.0389621
30	9.8292694	1381	9.8679779	1156	9.9612915	2537	10.0387085
31	9.8294075	1379	9.8678622	1157	9.9615452	2536	10.0384548
32	9.8295454	1379	9.8677466	1157	9.9617988	2537	10.0382012
33	9.8296833	1379	9.8676309	1157	9.9620525		10.0379475
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	L. Cos.		L. Sin.		L. Cot.		L. Tan.
							M

Sinus

G. 42

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.8296833		9.8676209		9.9620525		10.0379475	30
		1379		1158		2536		
31	9.8298212		9.8675151		9.9621061		10.0376939	29
32	9.8299589	1377	9.8673992	1159	9.9621597	2536	10.0374403	28
33	9.8300966	1377	9.8672833	1159	9.9622133	2536	10.0371867	27
34	9.8302342	1376	9.8671673	1160	9.9622669	2536	10.0369331	26
35	9.8303717	1375	9.8670512	1161	9.9623204	2535	10.0366796	25
36	9.8305091	1374	9.8669351	1161	9.9623740	2536	10.0364260	24
37	9.8306464	1373	9.8668189	1162	9.9624275	2535	10.0361725	23
38	9.8307837	1373	9.8667026	1163	9.9624811	2536	10.0359189	22
39	9.8309209	1372	9.8665863	1163	9.9625346	2535	10.0356654	21
40	9.8310580	1371	9.8664699	1164	9.9625881	2535	10.0354119	20
		1370		1165		2535		
41	9.8311950	1370	9.8663534	1165	9.9626416	2535	10.0351584	19
42	9.8313320	1368	9.8662369	1166	9.9626951	2535	10.0349049	18
43	9.8314688	1368	9.8661203	1167	9.9627486	2535	10.0346514	17
44	9.8316056	1367	9.8660036	1168	9.9628020	2534	10.0343980	16
45	9.8317423	1366	9.8658868	1168	9.9628555	2535	10.0341445	15
46	9.8318789	1366	9.8657700	1169	9.9629089	2534	10.0338911	14
47	9.8320155	1364	9.8656531	1169	9.9629623	2534	10.0336377	13
48	9.8321519	1364	9.8655362	1170	9.9630157	2534	10.0333843	12
49	9.8322883	1363	9.8654192	1171	9.9630691	2535	10.0331308	11
50	9.8324246	1363	9.8653021	1171	9.9631225	2533	10.0328775	10
		1363		1172		2534		
51	9.8325609	1361	9.8651849	1172	9.9631759	2534	10.0326241	9
52	9.8326970	1361	9.8650677	1173	9.9632292	2534	10.0323707	8
53	9.8328331	1360	9.8649504	1173	9.9632827	2533	10.0321173	7
54	9.8329691	1359	9.8648331	1175	9.9633360	2533	10.0318640	6
55	9.8331050	1358	9.8647156	1175	9.9633893	2534	10.0316107	5
56	9.8332408	1358	9.8645981	1175	9.9634427	2533	10.0313573	4
57	9.8333766	1356	9.8644806	1177	9.9634960	2533	10.0311040	3
58	9.8335122	1356	9.8643629	1177	9.9635493	2533	10.0308507	2
59	9.8336478	1355	9.8642452	1177	9.9636026	2533	10.0305974	1
60	9.8337833		9.8641275		9.9636559		10.0303441	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 47

Sinus				G. 43		Tangentes		
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	Sec.	L. Cot.	
0	9.8337833		9.8641275		9.9696559		10.0303441	60
		1355		1179		2532		
1	9.8339188		9.8640096		9.9699091		10.0300909	59
2	9.8340541	1353	9.8638917	1179	9.9701624	2533	10.0298376	58
3	9.8341894	1353	9.8637737	1180	9.9704157	2533	10.0295843	57
4	9.8343246	1352	9.8636557	1180	9.9706689	2532	10.0293311	56
5	9.8344597	1351	9.8635376	1181	9.9709221	2532	10.0290779	55
6	9.8345948	1351	9.8634194	1182	9.9711754	2533	10.0288246	54
7	9.8347297	1349	9.8633011	1183	9.9714286	2532	10.0285714	53
8	9.8348646	1349	9.8631828	1183	9.9716818	2532	10.0283182	52
9	9.8349994	1348	9.8630644	1184	9.9719350	2532	10.0280650	51
10	9.8351341	1347	9.8629460	1184	9.9721882	2532	10.0278118	50
		1347		1186		2531		
11	9.8352688		9.8628274		9.9724413		10.0275587	49
		1345	9.8627088	1186	9.9726945	2532	10.0273055	48
12	9.8354033	1345	9.8625902	1186	9.9729477	2532	10.0270523	47
13	9.8355378	1344	9.8624714	1188	9.9732008	2531	10.0267992	46
14	9.8356722	1344	9.8623526	1188	9.9734539	2532	10.0265461	45
15	9.8358066	1342	9.8622338	1190	9.9737071	2531	10.0262929	44
16	9.8359408	1342	9.8621148	1190	9.9739602	2531	10.0260398	43
17	9.8360750	1341	9.8619958	1191	9.9742133	2531	10.0257867	42
18	9.8362091	1340	9.8618767	1191	9.9744664	2531	10.0255336	41
19	9.8363431	1340	9.8617576	1191	9.9747195	2531	10.0252805	40
20	9.8364771							
		1338		1193		2531		
21	9.8366109	1338	9.8616383	1193	9.9749726	2531	10.0250274	39
22	9.8367447	1337	9.8615190	1193	9.9752257	2530	10.0247743	38
23	9.8368784	1337	9.8613997	1194	9.9754787	2531	10.0245213	37
24	9.8370121	1335	9.8612803	1195	9.9757318	2531	10.0242682	36
25	9.8371456	1335	9.8611608	1196	9.9759849	2530	10.0240151	35
26	9.8372791	1334	9.8610412	1197	9.9762379	2530	10.0237621	34
27	9.8374125	1333	9.8609215	1197	9.9764909	2531	10.0235091	33
28	9.8375458	1332	9.8608018	1197	9.9767440	2530	10.0232560	32
29	9.8376790	1332	9.8606821	1199	9.9769970	2530	10.0230030	31
30	9.8378122		9.8605622		9.9772500		10.0227500	30
	L. Sin.		L. Cos.		L. Cot.		L. Tan.	M

Sinus

G. 43

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
30	9.8378122		9.8605622		9.9772500		10.0217500	30
		1331		1199		2530		
31	9.8379453		9.8604422		9.9775030		10.0214970	29
32	9.8380783	1330	9.8603223	1200	9.9777560	2530	10.0212440	28
33	9.8382112	1329	9.8602022	1201	9.9780090	2530	10.0219910	27
34	9.8383441	1329	9.8600821	1201	9.9782620	2530	10.0217380	26
35	9.8384769	1328	9.8599619	1202	9.9785149	2529	10.0214851	25
36	9.8386096	1327	9.8598416	1203	9.9787679	2530	10.0212321	24
37	9.8387422	1326	9.8597213	1203	9.9790209	2530	10.0209791	23
38	9.8388747	1325	9.8596009	1204	9.9792738	2529	10.0207262	22
39	9.8390072	1325	9.8594804	1205	9.9795268	2530	10.0204732	21
40	9.8391396	1324	9.8593599	1205	9.9797797	2529	10.0202203	20
		1323		1206		2529		
41	9.8392719	1322	9.8592392		9.9800326		10.0199674	19
42	9.8394041	1322	9.8591186	1207	9.9802856	2530	10.0197144	18
43	9.8395362	1321	9.8589978	1208	9.9805385	2529	10.0194615	17
44	9.8396684	1320	9.8588770	1209	9.9807914	2529	10.0192086	16
45	9.8398004	1319	9.8587561	1210	9.9810443	2529	10.0189557	15
46	9.8399323	1319	9.8586351	1210	9.9812972	2529	10.0187028	14
47	9.8400642	1317	9.8585141	1211	9.9815501	2529	10.0184499	13
48	9.8401959	1317	9.8583929	1211	9.9818030	2529	10.0181970	12
49	9.8403276	1317	9.8582718	1212	9.9820559	2528	10.0179441	11
50	9.8404593		9.8581505	1213	9.9823087		10.0176913	10
		1315		1213		2529		
51	9.8405908	1315	9.8580292		9.9825616		10.0174384	9
52	9.8407223	1314	9.8579078	1214	9.9828145	2529	10.0171855	8
53	9.8408537	1313	9.8577862	1215	9.9830673	2529	10.0169327	7
54	9.8409850	1312	9.8576648	1216	9.9833202	2528	10.0166798	6
55	9.8411162	1312	9.8575432	1217	9.9835730	2529	10.0164270	5
56	9.8412474	1311	9.8574215	1217	9.9838259	2528	10.0161741	4
57	9.8413785	1310	9.8572998	1219	9.9840787	2528	10.0159212	3
58	9.8415095	1309	9.8571779	1218	9.9843315	2529	10.0156685	2
59	9.8416404	1309	9.8570561	1220	9.9845844	2528	10.0154156	1
60	9.8417713		9.8579341		9.9848372		10.0151628	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

Sinus			G. 44		Tangentes			
M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D. co.	L. Cot.	
0	9.8417713		9.8569341		9.9848372		10.0151628	60
		1308		1220		2528	----	—
1	9.8419021		9.8568121		9.9850900		10.0149100	59
2	9.8420328	1307	9.8566900	1221	9.9852428	2528	10.0146572	58
3	9.8421634	1306	9.8565678	1222	9.9855956	2528	10.0144044	57
4	9.8422939	1305	9.8564455	1223	9.9858484	2528	10.0141516	56
5	9.8424244	1305	9.8563232	1223	9.9861012	2528	10.0138988	55
6	9.8425548	1304	9.8562008	1224	9.9863540	2528	10.0136460	54
7	9.8426851	1303	9.8560784	1224	9.9866068	2528	10.0133932	53
8	9.8428154	1303	9.8559558	1226	9.9868596	2528	10.0131404	52
9	9.8429456	1302	9.8558332	1226	9.9871123	2527	10.0128877	51
10	9.8430757	1301	9.8557106	1226	9.9873651	2528	10.0126349	50
		1300		1228		2528	----	—
11	9.8432057	1299	9.8555878	1228	9.9876179	2527	10.0123821	49
12	9.8433356	1299	9.8554650	1229	9.9878706	2528	10.0121294	48
13	9.8434655	1298	9.8553421	1229	9.9881234	2527	10.0118766	47
14	9.8435953	1297	9.8552192	1231	9.9883761	2528	10.0116239	46
15	9.8437250	1297	9.8550961	1231	9.9886289	2527	10.0113711	45
16	9.8438547	1295	9.8549730	1231	9.9888816	2528	10.0111184	44
17	9.8439842	1295	9.8548499	1233	9.9891344	2527	10.0108656	43
18	9.8441137	1295	9.8547266	1233	9.9893871	2528	10.0106129	42
19	9.8442432	1293	9.8546032	1234	9.9896399	2527	10.0103601	41
20	9.8443725		9.8544799		9.9898926		10.0101074	40
		1293		1235		2527	----	—
21	9.8445018	1292	9.8543564	1235	9.9901453	2528	10.0098547	39
22	9.8446310	1291	9.8542329	1236	9.9903981	2527	10.0096019	38
23	9.8447601	1290	9.8541093	1237	9.9906508	2527	10.0093492	37
24	9.8448891	1290	9.8539856	1237	9.9909035	2527	10.0090965	36
25	9.8450181	1289	9.8538619	1238	9.9911562	2527	10.0088438	35
26	9.8451470	1288	9.8537381	1239	9.9914089	2527	10.0085911	34
27	9.8452758	1287	9.8536142	1240	9.9916616	2527	10.0083384	33
28	9.8454045	1287	9.8534902	1240	9.9919143	2527	10.0080857	32
29	9.8455332	1286	9.8533662	1241	9.9921670	2527	10.0078330	31
30	9.8456618		9.8532421		9.9924197		10.0075803	30
		----		----		----	----	—
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	M

G. 45

Sinus

G. 44

Tangentes

M	L. Sin.	Diff.	L. Cos.	D.	L. Tan.	D.co.	L. Cot.	
30	9.8456618		9.8532421		9.9924197		10.0075803	39
		1385		1242		2527		
31	9.8457903		9.8531179		9.9926724		10.0073276	29
32	9.8459188	1385	9.8529936	1243	9.9929251	2527	10.0070749	18
33	9.8460471	1383	9.8528693	1243	9.9931778	2527	10.0068222	27
34	9.8461754	1383	9.8527449	1244	9.9934305	2527	10.0065695	16
35	9.8463036	1382	9.8526204	1245	9.9936832	2537	10.0063168	25
36	9.8464318	1382	9.8524959	1245	9.9939359	2527	10.0060641	24
37	9.8465599	1381	9.8523713	1246	9.9941886	2527	10.0058114	23
38	9.8466879	1380	9.8522466	1247	9.9944413	2527	10.0055587	22
39	9.8468158	1379	9.8521218	1248	9.9946940	2527	10.0053060	21
40	9.8469436	1378	9.8519970	1248	9.9949466	2526	10.0050534	20
		1378		1249		2527		
41	9.8470714	1377	9.8518721	1250	9.9951993	2527	10.0048007	19
42	9.8471991	1376	9.8517471	1251	9.9954520	2527	10.0045480	18
43	9.8473267	1376	9.8516220	1251	9.9957047	2527	10.0042953	17
44	9.8474543	1374	9.8514969	1252	9.9959573	2526	10.0040427	16
45	9.8475817	1374	9.8513717	1252	9.9962100	2527	10.0037900	15
46	9.8477091	1374	9.8512465	1254	9.9964627	2527	10.0035373	14
47	9.8478365	1372	9.8511211	1254	9.9967154	2526	10.0032846	13
48	9.8479637	1372	9.8509957	1255	9.9969680	2527	10.0030320	12
49	9.8480909	1371	9.8508702	1256	9.9972207	2527	10.0027793	11
50	9.8482180	1370	9.8507446	1256	9.9974734	2527	10.0025266	10
		1370		1256		2526		
51	9.8483450	1370	9.8506190	1257	9.9977260	2527	10.0022740	9
2	9.8484720	1369	9.8504933	1258	9.9979787	2527	10.0020213	8
3	9.8485989	1368	9.8503675	1258	9.9982314	2526	10.0017686	7
4	9.8487257	1367	9.8502417	1260	9.9984840	2527	10.0015160	6
5	9.8488524	1367	9.8501157	1260	9.9987367	2526	10.0012633	5
6	9.8489791	1366	9.8499897	1260	9.9989893	2527	10.0010107	4
7	9.8491057	1365	9.8498637	1260	9.9992420	2527	10.0007580	3
8	9.8492322	1364	9.8497375	1262	9.9994947	2526	10.0005053	2
9	9.8493586	1364	9.8496113	1263	9.9997473	2527	10.0002527	1
0	9.8494850		9.8494850		10.0000000		10.0000000	0
	L. Cos.		L. Sin.		L. Cot.		L. Tan.	21

G. 45

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Pag. 9 lin. 27 absolvi posse: leg. absolvi posse suboluit:

Pag. 22 lin. pen. in quibus leg. in quas

Pag. 44 lin. 29 appidd leg. oppidd

Pag. 70 in fine adde omiſſa hæc verba

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Pag. 129. invenitur leg. inveniemus.

Pag. 165. col. 5 l. 1. 5657437 leg. 4637437

Pag. 236. col. 6 361 leg. 391.

Pag. 259. col. 8 l. 13 10 2916286 leg. 10.2616286

Fig. 5

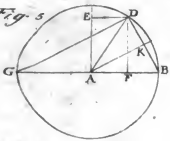


Fig. 10

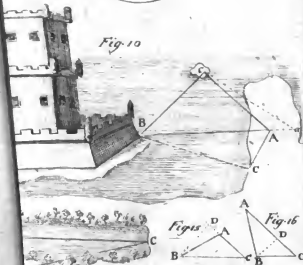


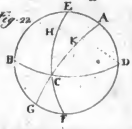
Fig. 15



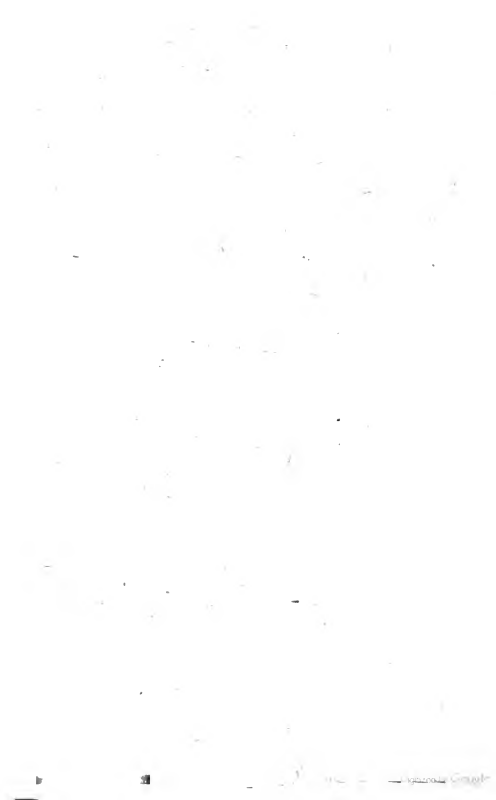
Fig. 16

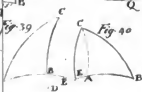
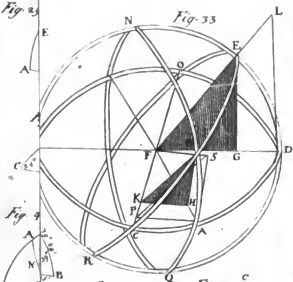
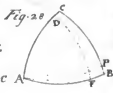
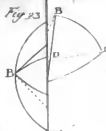


Fig. 22



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